

week.<sup>(2)</sup> The physiological factors regulating food intake tend to be more effective in defending against weight loss than against weight gain. This is thought to be an adaptive mechanism that protected humans from the adverse effects of famine and starvation. However, the physiological factors that tend to maintain calorie balance can be overwhelmed by environmental and behavioral factors that favor high calorie consumption or low physical activity. When weight gain occurs, a person's energy balance thermostat is reset to achieve calorie balance at the new, higher level of body weight. Thus once weight gain occurs, a new calorie balance level is established. The body then tends to defend against weight loss from this new, larger weight status.

Although the tendency for overweight and obesity is a product of complex interactions between physiological, genetic, environmental, and behavioral factors, the rapid increase in rates of overweight and obesity in the United States over the last several decades has occurred too rapidly for changes in genetic or physiological mechanisms to be solely the cause. Therefore, the emerging obesity epidemic is almost certainly due to changes in consumer food choices and physical activity levels resulting in an overall positive calorie balance and weight gain.

Total calorie intake refers to all energy consumed as food and drink. Proteins, carbohydrates, fat, and alcohol provide 4, 4, 9, and 7 calories per gram, respectively. Some calories (e.g., approximately 1.5 calories per gram) are obtained from dietary fiber that undergoes bacterial degradation in the large intestine to produce volatile fatty acids which are then absorbed and used as energy in the body. Physical activity such as walking 2 miles in 30 minutes burns approximately 150 calories. Because of limited capacity to convert excess calories to protein or carbohydrate, the body stores excess calories as body fat, regardless of whether the excess calories are caused by inadequate physical activity or excessive intakes of calories from any of the nutrient sources of calories. Reductions in large body fat reserves, which have often accumulated gradually over long periods of time, and subsequent maintenance of healthy body weight, will likely require long-term commitments to changes in eating and physical activity.

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<sup>(1)</sup> The term "energy balance" is commonly used to describe the relationship between the number of calories consumed from foods and the calories used by the body. For purposes of this document, however, the term "calorie balance" is used in place of "energy balance" since calories are the unit of energy measurement used for nutrition labeling and best understood by consumers. Therefore, in

this document, the terms "energy balance" and "caloric balance" are used interchangeably.

(2) Among the factors affecting body weight are body size and fat-free mass (i.e., the weight of the body less the weight of its fat mass) and also to a lesser degree age, gender, body composition, nutritional status, inherited variations, and/or differences in the hormonal status. Physical activity is the most variable of the calorie expenditures among individuals. For some individuals, physical activity is only a small proportion of the total calorie requirements; for very active individuals, it can be a significant proportion of daily calorie needs. Body weight is a major determinant of the calorie expenditure from physical activity. For example, the calorie cost of walking a mile at a moderate pace is 69 calories for a 140 pound individual and 58 calories for a person weighing 114 pounds. The intensity of physical activity can also affect calorie expenditure. For example, more calories are expended when jogging than when walking for the same amount of time.

## **Carbohydrates and Other Macronutrient Contributions to Caloric Value**

Macronutrients are the components of food that provide energy (i.e., calories). There are three categories of macronutrients: carbohydrates, proteins and fats. Carbohydrates represent over half, and fats about a third, of the energy intake of typical Western diets. Understanding the caloric contribution of macronutrients to the diet requires knowledge of their chemical composition.

**Carbohydrates** - Carbohydrates (sugars, e.g., glucose, sucrose; and starches) provide energy to cells in the body and glucose is a primary source of energy for the brain. Sugars and starches are broken down to glucose and the energy provided is 4 calories per gram. Other types of carbohydrates such as sugar alcohols (e.g., sorbitol, maltitol) and dietary fiber are not well absorbed by the small intestine and are fermented by bacteria in the large intestine. Carbohydrates that are fermented in this manner provide a lower energy value per gram.

The rapidity and extent of carbohydrate absorption by the body directly influence the speed and extent of the rise in blood glucose (i.e., glycemic response), which, in turn, triggers an insulin response. The glycemic index of carbohydrate-containing foods has been proposed as a way to quantify the blood glucose response following their consumption (Jenkins et al., 1981). Many factors can affect the

glycemic index of a single food, especially when the food is consumed in a meal.

Foods or meals that have a high glycemic index trigger the release of insulin into the blood. Elevated blood insulin levels stimulate the uptake of fat from the blood into fat cells, and inhibit the breakdown and release of stored fat from fat cells. Some scientists believe that consuming a high glycemic index food (e.g., a food that contains sugar or starch) can result in an increase in stored body fat.

Weight loss plans based on greatly restricting carbohydrate intakes have been promoted for more than a decade. "Low" carbohydrate products are being promoted as a way to reduce weight and to assist diabetics in their control of carbohydrate intake; however, not all carbohydrates raise blood glucose levels, nor deliver the same energy value per gram. In addition, when one macronutrient is restricted in a food product, it is often replaced with another macronutrient. For example, when "low" fat products were introduced several years ago, carbohydrates often were the replacement macronutrient. In many of the current "low" carbohydrate products marketed today, fat is often the replacement macronutrient. Also today many of the low carbohydrate products replace the high glycemic index carbohydrates (e.g., sugars and starches) with other carbohydrates such as sugar alcohols, which have no measurable glycemic index and may provide fewer calories per gram. Thus, it is important to look at the NFP to determine the calorie content of and the type of carbohydrate in a product.<sup>(1)</sup>

**Fats (lipids)** - A major source of energy for the body is derived from fats (lipids). Fats aid in the absorption of fat-soluble vitamins and carotenoids. There are two essential fatty acids,  $\alpha$ -linolenic and linoleic. Fats contribute 9 calories per gram. There are three major components: saturated fatty acids, trans fatty acids and unsaturated fatty acids (monounsaturated fatty acids and polyunsaturated fatty acids). All yield the same caloric value, but may affect metabolism differently. Saturated fatty acids and trans fatty acids raise blood lipid levels, especially cholesterol and low density lipoprotein cholesterol, which have known adverse health effects. There is no known requirement for trans fatty acid for specific body functions.

Acceptable Macronutrient Distribution Range (AMDR) has been estimated for individuals. The AMDR is the range of intake for a particular energy source that is associated with reduced risk of chronic disease while providing adequate intakes of essential nutrients. The AMDR for carbohydrates and fats is estimated to be 45 to 65 and 20 to 35 percent of energy, respectively, for all adults. Consumption of carbohydrates and fats within these ranges reduces the risk for obesity, as well as certain chronic diseases such as

coronary heart disease and diabetes.

**Proteins - Proteins make up the major structural components of cells and are composed of amino acids. There are 20 essential amino acids. Proteins function as enzymes, hormones, and have other important functions in the body. Proteins provide 4 calories per gram. Animal protein sources (e.g., meat, milk, eggs) generally contain balanced amounts of the essential amino acids whereas vegetable protein sources frequently have a limited amount of one of the essential amino acids. Foods that are low in fat tend also to be low in protein; foods that are low in carbohydrate tend to be high in protein and fat.**

**(1) FDA has received petitions requesting that the agency provide for nutrient content claims related to the carbohydrate content of foods. As discussed in section V.A.3.b., the OWG recommends that FDA file these petitions and publish a proposed rule to provide for nutrient content claims related to the carbohydrate content of foods, including guidance for the use of the term "net" in relation to carbohydrate content of foods.**

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Food Labeling and Nutrition | Calories Count

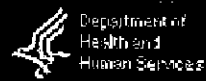
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**Counting Calories  
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**Appendix C  
Notice Concerning July 30, 2003 Secretary's  
Roundtable on Obesity/Nutrition**

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July 30, 2003

Department of Health and Human Services  
Secretary's Roundtable on Obesity/Nutrition  
Wednesday, July 30, 2003  
10:00 a.m. - 12:00 noon  
Washington, D.C.

Public Docket 2003N-0338

The Department of Health and Human Services (HHS) has established a public docket 2003N-0338 to receive additional information, perspectives, and suggestions from participants who attended the Secretary's Roundtable on Obesity/Nutrition on July 30, 2003.

Obesity is a growing and urgent public health problem in the United States. To address this problem, HHS Secretary Tommy G. Thompson has led the Department in its efforts to encourage healthy habits such as healthy diets, more exercise, and making healthy choices. Secretary Thompson continues to challenge HHS agencies and the leadership of the public health community to intensify their efforts to realize these improvements. The Secretary's Roundtable on Obesity/Nutrition is intended to enhance an HHS discussion with leading thinkers and experts in the public health community on the role that HHS can play in reducing or reversing the weight gain that leads to obesity. The Roundtable agenda included the following five focus questions:

1. What is the available evidence on the effectiveness of various education campaigns to reduce obesity?
2. What are the top priorities for nutrition research to reduce obesity in children?

3. What is the available evidence supporting whether public efforts should prioritize behavioral interventions to prevent obesity versus medical interventions to treat obesity?
4. What changes to food labeling could result in the development of healthier, lower calorie foods and the selection of healthier, lower calorie foods by consumers? What opportunities exist for the development of healthier foods/diets and what research might best support the development of healthier foods?
5. Based on the scientific foundation available today, what is the one thing that HHS could do that would make a significant difference in efforts to address the problem of obesity?

The Department has opened public docket 2003N-0338 to receive additional information, references, or thoughts from Roundtable participants in follow up to the July 30 discussion. We would appreciate receiving all follow up information and views by *Tuesday, September 30, 2003*. You should submit written comments to the Dockets Management Branch (FDA-305), Food and Drug Administration, 5630 Fishers Lane, Room 1061, Rockville, MD 20852. You may also submit comments electronically to <http://www.fda.gov/dockets/ecomments> or by email to [FDADOCKETS@oc.fda.gov](mailto:FDADOCKETS@oc.fda.gov). We request that you submit two copies of any written comments; individuals may submit one copy. Please ensure that you include the docket number 2003N-0338 in your submission. All comments submitted to the public docket are public information and may be posted to the FDA website (<http://www.fda.gov>) for public viewing.

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Appendix D  
August 11, 2003, Charge Memorandum

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Food and Drug Administration  
Rockville MD 20857

FROM: Commissioner of Food and Drugs  
TO: Lester M. Crawford, DVM, Ph.D.  
Deputy Commissioner  
Food and Drug Administration  
DATE: August 11, 2003  
SUBJECT: FDA Obesity Working Group

I am requesting the formation of a Working Group to confront the current obesity epidemic in the United States and to develop new and innovative ways to help consumers lead healthier lives through better nutrition. This issue is a top priority of the Office of the Commissioner as well as of the public health community both within and outside of government, because of the importance of consumer choices in preventing the serious health consequences associated with obesity, and in improving the health of the population. I am requesting that you serve as the Chair of this Working Group. Because the leadership role on nutrition issues in FDA resides within the Center for Food Safety and Applied Nutrition (CFSAN), I am requesting that Joseph Levitt, Director of CFSAN, assist you as the Vice Chair of this Working Group.

The goal of the FDA Obesity Working Group is to issue, within six months, a report that includes an action plan setting out specific means for developing and implementing the following goals:

1. Message.
  - The Working Group will develop a clear, coherent, and effective FDA message (within the broader context of DHHS) that will unify various public and private

efforts to reverse the current obesity epidemic.

2. Education Program to Deliver the Message.

- Outline an FDA program (component of DHHS program) for educating Americans about obesity and the means to prevent the disease.

3. Supporting the Message.

- *Food Labels:* Develop an approach for enhancing and improving the food label to assist consumers in preventing weight gain and reducing obesity;
- *Restaurants:* Develop an approach for working with the restaurant industry to create an environment conducive to better informed consumers;
- *Therapeutic Treatment:* Develop an approach for facilitating the development of therapeutics for the treatment of obesity;
- *Research:* Identify applied and basic research needs relative to obesity that include the development of healthier foods as well as a better understanding of consumer behavior and motivation.

4. Stakeholder Investment to Ensure Results.

- Provide for an active dialogue with outside invested stakeholders including consumer groups, academia, and the food and restaurant industry on developing a framework for consumers to receive messages about reducing obesity and achieving better nutrition.

Please consult with Joe Levitt as soon as possible regarding those who should be called upon to serve on the Working Group either as members or as supporting staff. While I encourage you to include experts from across FDA's Centers, as well as the Office of the Commissioner, I expect the Working Group's activities to be focused in and led by CFSAN. I also encourage you to seek the advice and input of other HHS agencies as needed.

Please report back to me by September 12, 2003, regarding the membership of the Working Group and an overall timetable for the group's work.

Thank you in advance for assuming a leadership role in confronting this extremely important and challenging public health crisis.

Mark B. McClellan, M.D.; Ph.D.

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Appendix E  
FDA Obesity Working Group

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MEMBERS

Name	Title / Affiliation
Lester Crawford (Chair)	Deputy Commissioner/Food and Drug Administration (FDA)
Robert Brackett (Vice Chair) <sup>(27)</sup>	Director/Center for Food Safety and Applied Nutrition (CFSAN)
Pat Kuntze (Executive Assistant)	Sr. Advisor for Consumer Affairs/FDA
Peter Salisbury (Executive Secretariat)	Acting Director, Executive Operations Staff/CFSAN
Alan Rulis	Senior Advisor for Applied Nutrition/ CFSAN
Susan Bond	Special Assistant to the Deputy Commissioner/FDA
Donna Howard	Special Assistant to the Senior Advisor for Applied Nutrition/CFSAN
Anne Crawford	Assistant to the Senior Advisor for Applied

	Nutrition/CFSAN
Christine Taylor	Director, Office of Nutritional Products, Labeling, and Dietary Supplements (ONPLDS)/CFSAN
Elizabeth Yetley	Lead Scientist for Nutrition/CFSAN
Kathy Ellwood	Director, Div. of Nutrition Programs and Labeling, ONPLDS/CFSAN
Richard Williams	Director, Div. of Market Studies, Office of Scientific Analysis and Support (OSAS)/CFSAN
David Acheson	Chief Medical Officer/CFSAN
David Orloff	Director, Division of Metabolic and Endocrinologic Drugs/Center for Drug Evaluation and Research (CDER)
Peter Pitts	Associate Commissioner for External Relations/FDA
Mike Landa	Deputy General Counsel, Office of the Chief Counsel/FDA
Tomas Philipson	Senior Economic Advisor to the Commissioner/FDA

**ADJUNCT MEMBERS (support workgroup as needed)**

<b>Name</b>	<b>Title / Affiliation</b>
Virginia Wilkening	Deputy Director/ONPLDS/CFSAN
Steven Bradbard	Supervisory Psychologist, Division of Market Studies, OSAS/CFSAN

Lisa Lubin	Consumer Safety Officer, Office of Food Additive Safety (OFAS)/CFSAN
Rick Canady	Senior Science Policy Analyst, Office of Science Coordination and Communication (OSCC)/FDA
Jeff Shuren	Assistant Commissioner for Policy, Office of Policy, Planning, and Legislation (OPPL)/FDA
Susan Bernard	Senior Public Health Advisor, OPPL/OC
Susan Wood	Director, Office of Women's Health, OSCC/OC
Joanne Lupton	Visiting Scholar, CFSAN

#### **EXTERNAL LIAISONS**

<b>Name</b>	<b>Title / Affiliation</b>
Van Hubbard	Director, National Institutes of Health (NIH) Division of Nutrition Research Coordination
Karen Donato	Coordinator, NIH National Heart, Lung, and Blood Institute Obesity Education Initiative
William Dietz	Director, Division of Nutrition and Physical Activity/Centers for Disease Control and Prevention (CDC)
Judith McDivitt	Team Leader for Health Communications, Division of Nutrition and Physical Activity/CDC
Karyl Thomas Rattay	Physical Activity, Nutrition and Children's Health Advisor, Office of Disease Prevention and Health Promotion/U.S. Department of Health and Human Services (DHHS)
Jonelle C. Rowe	Senior Medical Advisor, Office of Women's Health/DHHS

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(27) When the OWG was formed, Joseph A. Levitt was the Director of CFSAN, and the OWG vice-chair. As of January 5, 2004, Dr. Brackett became director of CFSAN, and assumed the role of vice-chair.

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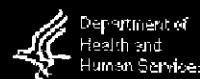
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Appendix F  
FDA Obesity Working Group  
Subgroup Members

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**OBESITY KNOWLEDGE BASE**

**Lead:** Donna Howard

**Members:** Rick Canady, Elizabeth Yetley, Rich Williams, Kathy Koehler, Theresa Mullin, Susan Bernard, Anne Crawford, Brian Somers

**MESSAGE**

**Lead (Message):** Peter Pitts

**Members:** Christine Taylor, Naomi Kulakow, Steven Bradbard, Vicky Kao, Susan Bernard, Nancy Ostrove

**EDUCATION**

**Lead (Education):** Susan Bond

**Members:** Marjorie Davidson, Naomi Kulakow, Steven Bradbard, Jeannie Ertter-Prego, Susan Wood, Kimberly Rawlings, Susan Bernard, Vicky Kao

**FOOD LABELS**

**Lead:** Kathy Ellwood

**Members:** Virginia Wilkening, Felicia Satchell, Amy Lando, Alan Levy, Mary Brandt, Lori LeGault, Ritu Nalubola

**RESTAURANTS/INDUSTRY**

**Co-Leads:** Tomas Philipson and Susan Bond

**Members:** Mike Landa, Faye Feldstein, Glenda Lewis, Rich Williams, Clark Nardinelli, Carolyn Young, Andrew Estrin, Mark Schwartz

## **THERAPEUTICS**

**Lead:** David Orloff

**Members:** Eric Colman, Patricia Beaston

## **RESEARCH**

**Lead:** David Acheson

**Members:** William Slikker, Kathy Ellwood, Rick Canady, Elizabeth Yetley, Lisa Lubin, Virginia Wilkening, Richard Williams, Jeremiah Fasano, Shirley Blakely, Eileen Parish, Kathleen Koehler

## **STAKEHOLDER INVESTMENT**

**Lead:** Pat Kuntze

**Members:** Lisa Lubin, Brian Somers, Jonathan Chappell, Juanita Yates, Amber Jessup, Ray Formanek, Jennie Butler, Darlease Hyman, Mary Hitch, Alyson Saben, Patricia Alexander, Alta Hayes, John Henkel, Susan Cruzan, Jane Peterson

## **REPORT WRITING**

**Lead:** Alan Rulis

**Members:** Mike Landa, Paulette Gaynor, Pete Salisbury, Anne Crawford, Brian Somers, Virginia Wilkening, Cindy Wise

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Counting Calories  
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**Appendix G**  
**Report from the Division of Market Studies**  
**Office of Scientific Analysis and Support,**  
**FDA CFSAN**

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Office of Scientific Analysis and Support  
Center for Food Safety and Applied Nutrition, FDA

In support of the Obesity Working Group, FDA

December 28, 2003

Study Authors:

Richard A. Williams - Director, DMS  
Amber Jessup - Project Officer  
Amy Lando - Project Officer  
Cristina McLaughlin - Project Officer  
David J. Zorn - Project Officer  
Kathleen M. Koehler - Primary Writer and Editor  
Steve Bradbard - Team Leader, Consumer Studies  
Clark Nardinelli - Team Leader, Economics

Contributors to Literature Review:

Steve Bradbard, Andrew Estrin, Amber Jessup, Kathleen Koehler, Amy Lando, Jordan Lin,  
Clark Nardinelli, Linda Verrill, David Zorn, Judy Labiner

\* This report was prepared for Ms. Laina Bush of the Office of the Assistant Secretary for Planning and Evaluation, DHHS. Ms. Bush funded the studies and is a Project Officer on all of the individual studies except the survey of restaurant Web sites.



## **Helping Consumers Lead Healthier Lives through Better Nutrition:**

### **A Social Sciences Approach to Consumer Information, Food Choices and Weight Management**

**A Report from the Division of Market Studies  
Office of Scientific Analysis and Support, FDA CFSAN**

**January, 2004**

#### **Executive Summary**

This summarizes an interim report on the social science research on weight management done for both the Obesity Working Groups in FDA and the Office of the Assistant Secretary for Planning and Evaluation, DHHS. In these studies, we examined how consumers use existing food labels for weight management; how changes to food labels might improve those practices; how restaurants are currently labeling; how consumers would react to different kinds of labels; and what policies could induce manufacturers to produce healthier foods. Our research has included both review of the current social sciences literature and some new studies. First, in qualitative studies, consumers claim they do not wish to spend a significant amount of time reading and comprehending labels. This is borne out by the fact that many use health or nutrient content claims as signals as to the quality of the entire product and do not check the nutrition facts panel on the back. Also, consumers appear to be confused by serving sizes, particularly by multiple servings listed on small packages, as well as by percentage daily values listed in the nutrition facts panel. Consumers use food labels for multiple reasons, including diet plans and pre-existing health conditions such as diabetes and heart disease, and look for macronutrients of concern. Although we found some labeling in restaurants (by examining their websites), consumers clearly want more nutrition information in restaurants although most claim they will use it only part of the time. In fact, the limited number of studies we examined showed mixed results as to whether restaurant labels would be used but studies also show a correlation of overweight with a higher percentage of food consumed away from home. Consumers state qualitatively that they would like all nutrition information in restaurants but would even find calorie labeling helpful. Finally, consumers appear to be interested in signals of healthy foods, both in supermarkets and restaurants. In interviews, manufacturers state that to encourage production of healthier foods FDA should examine not just labeling policies, but other areas that affect product formulations such as food standards.

Two projects underway are not far enough along to give interim reports. The first is the creation of an economic model of food choice that will answer such questions as, "do food labels help consumers maintain their desired weight"? In addition, we are in the process of getting a restaurant chain to investigate actual market consumer reactions to nutrition labeling on menu boards. The source of our suggested menu board changes will be the results of our focus group studies. Beyond these initial studies, additional research could be done for food labels to investigate both whole package labeling (instead of serving sizes) and nutrient density labeling (e.g., calories per cup). To give consumers better signals, we could also investigate the use of a logo on the front of the package to both signal consumers to the presence of a healthy (or

healthier) food and to serve as a motivator for production of such foods. Alternatively, we could evaluate the effectiveness of educating consumers on both the use of daily values and how servings sizes should be evaluated in light of portion sizes. The relationship between eating out and weight management could be investigated both for various kinds of restaurants and for different socioeconomic groups. Finally, there are a number of existing FDA policies such as food standards and nutrient content claims that could be examined to see how changes could encourage more reformulation toward lower calorie or healthy foods.

## **I. Purpose**

In August, 2003, FDA Commissioner Mark B. McClellan declared FDA's intention to confront the current obesity epidemic in the United States and to develop new and innovative ways to help consumers lead healthier lives through better nutrition. FDA's Center for Food Safety and Applied Nutrition (CFSAN) plays a leadership role in nutrition issues at FDA. Within CFSAN, the Division of Market Studies (DMS) in the Office of Scientific Analysis and Support (OSAS) provides expertise in Social and Population Science issues related to CFSAN's mission, including expertise in Economics and Consumer Sciences. Our first charge was to undertake a group of short-term studies on: a) how consumers use current food labels to maintain weight; b) how consumers would use potential changes in food labels, including new labeling in restaurants; and, c) how manufacturers react to labeling requirements with new products and product reformulation. Our second charge was to develop a longer term research agenda on labeling and weight management.

The research goal is to develop knowledge on how to lower the cost (time and effort in choosing foods) to consumers of managing their weight, using labeling and education. In choosing foods for healthy eating, consumers must solve a series of information problems including: 1) determining what constitutes a healthy diet; 2) finding products that meet their nutritional needs; and, 3) evaluating nutritional characteristics of particular products. This information comes from a variety of sources such as media, friends, school, physicians and, of course, food labels and restaurant menus. From the standpoint of consumer behavior, or the "demand side" of the market, we will examine the psychology of people's perceptions, eating habits and desires relative to healthy eating and weight management. From the standpoint of producer behavior, or the "supply side" of the market, we examine how producers make decisions to make and market healthy foods (including decisions about serving and package sizes) and provide information about those foods. Our research follows the natural division of packaged food products in grocery stores and food consumed in restaurants, although issues in these two areas often overlap. Our results are cross-cutting, with relevance to several areas, including food labels, restaurants and research.

## **II. General Concepts of Weight Management**

**Public health importance.** The scope of the growing and urgent public health problem of obesity was outlined in the Surgeon General's Report (US DHHS 2001). In 1999-2000, 65% of U.S. adults were overweight, increased from 56% when surveyed in 1988-1994; 30% of adults were obese, increased from 23% in the earlier survey (Flegal 2002). Among children age 6 through 19 years, 15% were overweight, compared with 10 to 11% in the earlier survey (Ogden 2002). Overweight and obesity are associated with increased morbidity and mortality. It is estimated that about 300,000 deaths per year may be attributed to obesity, and overweight and

obesity increase the risk for coronary heart disease, type 2 diabetes, and certain cancers (Allison 1999, US DHHS 2001). The total economic cost of obesity in the United States is about \$100 billion per year, including more than \$50 billion in avoidable medical costs, more than 5 percent of total annual health care expenditures (US DHHS 2001, Finkelstein 2003).

**Energy balance.** Weight gain occurs when there is an energy imbalance, with "energy in" (calories from food) exceeding "energy out" (resting metabolism plus physical activity). This report addresses issues related to the "energy in" side of the energy balance equation: food choices and the food environment. A general consideration of increasing "energy out" through physical activity, while important, is beyond the scope of this report. However, we do consider how information about the physical activity equivalent of food calories might affect consumer food choices.

**Genes and the environment.** Genetic influences on obesity are complex and are just beginning to be elucidated (Shuldiner 2003). Based on twin, adoption and family studies, it is estimated that 40 to 70% of the current population variation in body mass index (BMI) can be explained by genetic factors (Shuldiner 2003, Allison 2003). However, even relatively modest decreases in the remaining, non-genetic, "environmental liability" for obesity can nevertheless be predicted to result in meaningful decreases in BMI and corresponding health risks (Allison 2003).

**Weight management and the food environment.** Evidence from research on taste preferences, eating regulation and weight-loss interventions suggests that overweight individuals and those prone to overweight may be particularly vulnerable to the modern food environment (Lowe 2003). This "obesigenic" environment features unlimited quantities of a variety of foods high in caloric density (which tend to be foods high in fat, sugar, or both), together with minimal need for energy expenditure (Lowe 2003), perhaps making it more difficult for obesity prone individuals to regulate energy intake. A promising approach to improving weight control is therefore to focus on changes in the food environment: the availability, structure, composition and portion size of foods. There is potential for changes in the food environment both at the general (or population) level and at the level of the individual (personal food environment). For example, a change in the food environment at the population level might be the availability of more food choices that facilitate weight control. A change in the personal food environment might be to stock one's home with ingredients and foods that facilitate weight control (Lowe, 2003). A current challenge is to provide information and assistance to enhance the ability to determine one's personal food environment.

**The role of food labeling.** Since passage of the Nutrition Labeling and Education Act 10 years ago, consumers have had nutrition labeling on most packaged foods (small product lines were excluded as were foods packaged on premises in supermarkets and delis). As discussed later, it is clear that consumers both like and use the nutrition information on the back of food packages and the health and nutrient content claims on the front of packages. However, it is not clear how successful consumers have been at using labels to eat healthy diets. Research is necessary to establish whether the food label is as useful as it could be in assisting consumers by making weight management as easy as possible.

**The role of restaurants.** Unless restaurants make nutrient content or health claims, they are not required to provide consumers with any information on the nutrient content of their foods, an obvious gap in information. This exclusion applies to all eating places away from home,

including school cafeterias, nursing homes, military establishments and hospitals. Research is needed on how to address the current information gap by tailoring labeling to the special circumstances of eating places away from home. Unlike packaged food, restaurant food is characterized by frequent recipe changes, both for routine use and at the request of consumers for special preparation. This may have been an insurmountable hurdle for most restaurants in the past, when nutrition information had to be determined by direct chemical analysis. However, this hurdle may be decreased at present with the ubiquitous availability of nutrient composition databases and software for labeling, coupled with the explosive growth in personal computers and personal digital assistants, even if the restaurant labeling lacks the precision of that now required of packaged foods.

**A changing environment.** In the quantum uncertainty principle in physics, observation of a system perturbs the system, resulting in measurement uncertainty. Similarly with the restaurant industry, recent attention by public health officials, litigators and the media on restaurants and weight management issues has resulted in changes in the marketplace. Restaurants have begun offering more nutrition information and featuring healthier menu selections. Research is needed to describe current restaurant practices, and to evaluate their effectiveness in assisting consumers with weight management. Additionally, although the introduction of healthier food selections by packaged food manufacturers dates to before the passage of NLEA, the current interest in weight management is likely to speed the introduction of products for healthier eating.

### III. Overview of Current Issues and Related Literature

#### A. Current Issues.

In response to current concern about problems of obesity and weight management, some specific issues have emerged in articles, statements, presentations, and dialogue among consumers, industry, scientists and public health officials.

**Consumers and packaged food labels.** Even though food labels are widely used and accepted in the population, there are potential problems that may be limiting food label use or its effectiveness as a tool in weight management.

- **Numerical calories.** Is the numerical calorie designation prominent enough on the food label? Do consumers understand and use the numerical calorie designation? Do consumers do the math needed to calculate their daily caloric intake using food labels? Should they do so? Can or should consumers know how their own recommended caloric intake compares with the 2000 calorie per day reference on the food label?
- **Daily Values.** Do consumers understand or use the percent Daily Value (%DV) figures on food labels? If they neither use nor understand them, can consumer education develop an appreciation and understanding of these figures? How can the food label best help consumers place the caloric content of foods in the context of a daily diet: for example, add a %DV for calories, add a qualifier such as "high", "medium", "low", use symbols to indicate "high", "medium", "low", etc?
- **Serving sizes.** Larger package sizes that are commonly consumed in one sitting may contain two or more standard servings for nutrition labeling. If consumers are not aware of the number of serving sizes, they may believe they are consuming fewer calories than

they are if they consume the entire package.

- **Nutrition goals.** Because consumers are interested in different types of nutrition information from food labels depending on their particular health concern or diet, do they want to know, in a global sense, whether or not a food is "healthy"? Would consumers benefit from qualitative symbols or cues on labels of "healthy" foods?
- **Trade-offs.** Rather than numerically calculate a "daily diet", consumers may rather try to choose foods that are healthy when they are inclined. They may balance a healthy choice if they have made an unhealthy choice in the previous eating occasion, but not quantitatively. How can the food label use qualitative symbols or cues to build on consumers' inclinations for qualitative "trade-offs"?
- **"Halo" effects of claims.** A "halo" effect occurs when a consumer reacts to a particular positive claim about a product and assumes that the entire product has positive attributes. For example, a low fat claim may signal to some consumers that the product is also low calorie. How can the food label use claims effectively to assist consumers in weight management, while avoiding halo effects or other unintended consequences of claims?

**Restaurants.** As noted above, the absence of calorie and nutrition labeling of restaurant food represents an information gap.

- **Portion size and calories.** In part because of large portion sizes in many restaurant offerings, the calorie content of restaurant meals may be much higher than consumers realize. Additionally, restaurant offerings may have higher calorie and saturated fat density (per weight or volume) than similar foods eaten at home. Would better availability of calorie information in restaurants help consumers with weight management?
- **Restaurant information format.** Some restaurants voluntarily offer nutrition information, but it is often not in an accessible format. The information is often available only after purchase, and may have confusing charts or formats and very small type size. What is the current status of voluntary restaurant nutrition information and what guidelines for format and availability would best help the consumer with weight management?
- **Menu item variability.** Are there creative approaches that would make restaurant nutrition labeling feasible in spite of the variations in menu item preparation?

**Food Formulation.** Changes in food labels and shifts in consumer perceptions and public health concerns can change the incentives and constraints food manufacturers face in producing and marketing foods. Producers may decide to change the formulation of foods if their expected private benefits exceed their expected private costs. Reformulation of existing products or introduction of new products occurred as a result of the appearance of health claims on food packages in the 1980's, the mandatory listing of fat content on food labels in the 1990's and awareness and proposed labeling of trans fat in the late 1990's.

- **Weight management and food reformulation.** Have producers formulated products to be low in calories or to respond to the weight management issue? What are the barriers or incentives to food formulation for weight management? How could these barriers be removed or incentives provided?



## **B. Related Literature.**

**[Contributors to literature review: Steve Bradbard, Andrew Estrin, Amber Jessup, Kathleen Koehler, Amy Lando, Jordan Lin, Clark Nardinelli, Linda Verrill, David Zorn]**

The importance of social science principles in formulating and implementing nutrition policy was recognized years ago with the work of the National Research Council's Committee on Food Habits during World War Two (Gifford 2002). More recently, FDA conducted consumer research before the implementation of NLEA, to determine the usefulness of potential choices for the Facts panel format. Since NLEA, FDA and other researchers have studied how consumers use the Nutrition Facts panel, nutrient content claims, and health claims (separately and in combination) to make dietary choices.

Consumer research is used to assess people's knowledge, attitudes, perceptions, and preferences for a topical subject area or reactions to any type of stimuli. Research methods may include qualitative studies, such as focus groups; quantitative, nationally representative surveys, using structured questionnaires; experimental studies of consumer responses to labeling and package variations; and intervention studies of the effects of point of purchase labeling.

**Food label use and diet.** Research clearly shows that most Americans are familiar with and use the Nutrition Facts panel. In a 2002 FDA survey, 69 percent of the U.S. population reported using food labels often or sometimes when they buy a product for the first time (FDA, 2003). Our more detailed review of the literature on food label use is in Appendix A. The literature on food label use was also recently reviewed by the Institute of Medicine (IOM 2003).

In FDA's survey, people reported using the food label for many reasons, most commonly to see how high or low the food is in calories and in nutrients such as fat, sodium, or certain vitamins (FDA 2003). However, although consumers report using the food label to make dietary choices, they may not fully understand all of the information on the Nutrition Facts panel, particularly the %DV (Appendix A, IOM 2003). Evidence from experimental studies suggests that %DV information can help consumers judge the healthfulness of a food better than absolute amounts of nutrients alone (Levy, Fein, and Schucker, 1996 and Barone et al, 1996). However, in some surveys the majority of respondents could not accurately define or use the %DV for fat (FMI 1996, Levy et al 2000).

In experimental studies, consumers could correctly use the Nutrition Facts panel on the back of food packages to verify and evaluate the health and nutrient content claims on the front of packages (Garretson and Burton, Mitra et al, Ford et al., Roe et al.). However, when there was no Nutrition Facts panel, consumers were misled by claims into thinking a product was - healthier than it really was (Ford et al., Roe et al.) and when consumers were not specifically directed to consult the Nutrition Facts panel some cut short their information search and drew conclusions based on health or nutrient content claims (on the front of the package) alone (Roe, Levy and Derby).

As noted by the Institute of Medicine, the body of literature on the association of food label use and diet is relatively small (IOM 2003). Several studies have reported correlations between food label use and diet (Appendix A). For example, survey respondents who used the Nutrition Facts panel were more likely to consume a lower fat diet, both in the general population and among family clinic patients (Neuhouser et al, Kreuter et al). Clinic patients with health conditions such as high blood pressure and high cholesterol were more likely to look on the label for

sodium and cholesterol information, respectively (Kreuter et al).

The calorie content of food is a common use of the food label, and was among the top three pieces of information sought by 80 percent of label readers in one survey (IOM 2003). However, there has been little research on the relationship between label use and weight management/weight loss or gain.

The use of "healthy" food logos on food packages was recently reviewed (Smith et al 2002). Such programs feature a package logo or symbol on food meeting certain nutrition criteria set by the program's administering body. Examples include the U.S. American Heart Association "Heart Check", the Canadian Heart and Stroke Foundation "Health Check", the Australian "Pick the Tick" and the Swedish "Green Keyhole". In general, consumers report support for the programs and are able to interpret meaning accurately (Smith et al 2002). Some evidence also indicates the programs have a positive effect on food formulation. Additional research is needed on the effect of such programs on food purchase and consumption (Smith et al 2002).

**Restaurants.** A number of experimental studies have examined consumer behavior in cafeteria, restaurant and vending machine settings in response to nutrition information or health messages. The results of these studies are mixed; differences in results among studies may be due to differences in experimental designs, including size of sample, demographic characteristics of participants, experimental setting, length of study, type of nutrition information or health message and type of behavioral outcome studied (Appendix A).

In general, consumers have mixed reactions to nutrition information in cafeterias and restaurants. Both health claims and listing of nutrition information have been found to be capable of producing positive influences on consumer evaluations of menu items and the influences appear to be strongest when nutrition information about alternative menu items is absent. Although nutrition information may influence choices and attitudes, other factors may be more salient: whether the respondent is on a diet, attitudes toward nutrition, price of food, health claim vs. nutrition information, taste/perceived taste.

An analysis of studies received from the USDA Economic Research Service (their own and others) shows that eating away from home, particularly increasing consumption in fast food restaurants, is correlated with increases in BMI. Further, the per capita number of restaurants in a state was positively related to individual's BMI and the probability of being overweight. See Appendix A for charts summarizing these studies, used courtesy of USDA ERS.

**Motivation.** The process of consumers' motivation and readiness for lifestyle changes such as weight management are described by a behavioral sciences model, the Transtheoretical Model of Change (Prochaska). The model identifies five stages-of-change - Pre-contemplation, Contemplation, Preparation, Action, and Maintenance; and emphasizes that a message must be matched to a respective stage in order to be most effective (e.g., messages targeting consumers in the action stage will likely be ineffective for consumers in the pre-contemplation stage). Thus, the effectiveness of food and restaurant labeling or messages for weight management would depend in part on consumer readiness and stage of change.

**Portion sizes and energy density.** Although consumer motivation is important for weight management, there is also interest in other factors that facilitate weight management in the

current "obesogenic" environment. Two aspects of the food environment have been recently highlighted as having implications for weight control: increased portion size and the energy-density of foods. Portion size of restaurant foods increased from the 1970's through the 1990's (Rolls 2003). National survey data show that portion sizes of food eaten both in the home and away from home increased from 1977 to 1998 (Rolls 2003). Energy density refers to the number of calories per given weight or volume of food. The fat content of food increases the energy density and the water content lowers the energy density. Although energy density can be decreased by decreasing the fat content of the food, this approach can be self-limiting because decreasing the fat content also decreases satiety, the extent to which the food satisfies the urge to eat. Research has shown that increasing the proportion of water-rich vegetables in mixed dishes such as casseroles decreases the energy density without decreasing satiety (Rolls 2003).

**Eating cues.** Other research has examined consumer behavior in the context of the eating environment. Results indicated that people's eating responses are often automatic and respond to cues such as package size, shape and structure (Wansink 2003). For example, research participants ate more food when they were given larger containers, even when the food was unpalatable stale popcorn. People also reduced consumption automatically in response to cues such as package structure or dividers, for example, red potato chips at intervals in a tube of regular chips (Wansink). This research suggests that changes in food packaging and presentation can be complementary to labeling and nutrition information in assisting consumers with weight management.

#### **Weight management and economic theory**

One economic rationale for government action is a situation called market failure, in which there is a consumer demand not being met by the market. One possible market failure is the absence of nutrition labeling in restaurants, where restaurateurs know more about the nutritional content of their meals than their clients. Further, information remedies provided by the government work best if information is structured in a way that best assists consumer understanding and use. It is not clear after ten years of experience whether the label on packaged food, including both claims and the nutrition facts panel, is presented in the optimal way for consumers.

However, although many consumers clearly wish to lose weight, survey's show that they believe this is primarily the responsibility of each individual. It is not clear exactly which market can help consumers to control their own eating habits although weight loss and diet information and programs and clubs are widely available at reasonable prices. Although there is no obvious market failure, there is a sense that FDA could do more to assist consumers with the important public health issue of weight management. The theory of constitutional economics holds that people often turn to government to constrain their choices to assist them in their long-term goals (Brennan and Buchanan, 1985, especially pp. 67-81), and this theory can provide a rationale for government action on weight management. Consumers may prefer to have food choices externally constrained rather than to bear the cost of restraining their own food consumption. If FDA can take actions that alter the set of food choices offered to consumers, consumers may be better off even if those changes eliminate foods that are currently consumed. An example is stimulating reformulation of current foods through changes in labeling. If labeling causes changes in the food offered to consumers, then the set of available foods has been altered. Consumers may prefer this form of external restraint to voluntarily restraining their daily food consumption.



*Changes in product formulation. Evidence suggests that not only do consumers respond to labeling, but producers also respond to consumers' concerns about diet by producing healthier products. Decisions to change the composition of foods will depend on whether producers anticipate that the expected private benefits of changing the formulation will exceed the expected private costs of doing so. Analyses conducted for FDA have examined the effect of hypothetical labeling policy changes on manufacturers' expected decisions to reformulate foods (Honeycutt et al 1998, White et al 2002, Muth et al 2003). Further research is needed with respect to weight management and food formulation; to evaluate how labeling changes might motivate product reformulation, provide opportunities for marketing healthful products, and stimulate competition based on nutrient and health claims that assist consumers with weight management.*

### **III. Current Research Projects.**

The Division of Market Studies is currently engaged in four short-term projects to address current issues in weight management. The projects are: 1) focus groups on consumer response to nutrition information on packaged food and in restaurants; 2) a survey of nutrition information available on restaurant web sites; 3) discussions with manufacturers regarding incentives and barriers to food formulation; 4) a quantitative social sciences model of dietary and weight management behavior. Preliminary results, currently available for the first three projects, make possible some suggestions for further research and indicate issues for further consideration. We plan to conduct further analysis of the complete results and consideration of the relationships among the four projects.

#### **1. Focus Groups on Food and Restaurant Labeling and Weight Management [Amy Lando, Steve Bradbard]**

In response to FDA's concern over the rise in obesity and overweight in the United States, we conducted a series of eight focus groups, funded by HHS/ASPE, to explore: (1) how consumers use the nutrition information on food labels; (2) what type of nutrition information they would like to see in quick service restaurants; and, (3) which messages would be effective as part of a public information and education effort aimed toward encouraging consumers to use the food label. Participants discussed and reacted to variations in the Nutrition Facts Panel and the principal display panel on food packages and to various presentations of nutrition information at restaurants.

The focus groups were held in November and December 2003, in Calverton, Maryland, Philadelphia, San Antonio, Texas, and Chicago. The groups, which each had between 7 to 10 participants, were segregated by gender and education. All focus group participants were at least 18 years old, had been grocery shopping and had eaten in a fast food and/or quick service restaurant in the past month.

#### **TOPLINE RESULTS:**

The following findings are preliminary and are based on observations recorded by the observer, as well as post-group discussions with the focus group moderator and other observers. These topline results are not based on a complete analysis of the focus group tapes and/or transcripts, which will be used to compile the Final Report. Also, since these findings are based on

qualitative research with small sample sizes, they should not be viewed as nationally representative or projectable.

#### **General Nutrition:**

1. **Attitudes towards nutrition.** In many of the groups, especially the women's groups, people cared about nutrition and report using the Nutrition Facts Panel (NFP). Many were quite savvy about nutrition. At the same time, however, many also said that they don't always consider nutrition when deciding what to eat. Taste, convenience, price, what kind of mood they are in, and what their family eats were often at odds with healthy eating. While participants were interested in calories, many pointed to multiple concerns that went beyond calories such as the level of saturated fat, total fat, cholesterol, carbohydrates and sodium.
2. **Macronutrients.** In general, individual people tended to care more about some macronutrients than others depending on the diet that person was following. In most groups, at least one person was familiar with the Atkins diet and many of these people were most concerned about carbohydrates and sugars. Others were concerned about fat and saturated fat. Some people checked the NFP mostly for information about sodium. Those who were on the Weight Watchers diet were concerned about calories and fiber.
3. **% Daily Value.** Very few participants reported using the % Daily Value (%DV) column on the NFP. Either they did not understand the meaning of %DV or they thought that it was not relevant to them since they did not consume a 2000 calorie diet. Those who did use or might use %DV thought that it was a good way estimate how much of a particular nutrient they were eating or to gauge a healthy and balanced diet.

#### **Food Label Modification:**

4. **Large package sizes.** In all the groups participants were presented with a mock-up of a 20oz soda and large packaged muffin. Both of these products are thought to be commonly consumed in one sitting, but have more than one serving size listed. Most participants said that neither the muffin nor the soda was a healthy food. They pointed out that the soda had a lot of sugar and calories and that the muffin was high in fat, calories, and carbohydrates.
5. **Serving versus package.** In general, participants thought it was misleading to list either product as having more than one serving. Many did realize that if you eat the entire package you would need to multiply the serving size by the nutrient of interest, though some were confused and made mistakes when trying to calculate in their heads. They were not surprised to see these products labeled as multiserving packages.
6. **Calorie-related variations.** The first test label added a %DV for calories, removed the *calories from fat* line, enlarged the calories line, and changed that way serving size was declared. In general these changes were not noticed by participants. When the new wording for serving size was pointed out, most did not think it was an improvement over the existing language.
7. **Serving size variations.** The second test label had two %DV columns on the NFP, one for a single serving and one for the entire package. In the first four groups, the absolute quantities of macronutrients were only listed for the single serving size. After comments

from these groups, the label was modified to have the absolute amount for both a serving and the entire product. Participant reaction to this modification was positive, but some thought it was not necessary to list the amount for a single serving, and others preferred to have the absolute amount replace the %DV in the columns.

8. **Calorie cues.** We tested both a starburst with the calories per serving (first four groups) and a white square with calories per whole product (last four groups). The starburst was misleading to many since they thought the manufacturer was trying to indicate the entire product had fewer calories than it did. The white square with the total calories per product got mixed reactions, but many just said that they recognized these as high calorie products and would stay away from them.
9. **"Healthy" (keyhole) symbol.** In half of the groups we tested a "healthy" meat lasagna with a purple keyhole symbol on the front of the package. There was generally positive reaction to including a front of package symbol indicating that a product was healthy, as long as they understood the definition of the symbol and could trust that it was true. They believed that they would have to be educated as to the meaning of such a signal. Some mentioned that they would look for the keyhole when they were in a hurry in the store. They expressed some concern that these products would cost more or that they would lack in taste.

#### **Restaurant Labeling:**

10. **Nutrition information.** Most people seemed interested in having nutrition information available to them when they eat at fast food and/or quick service restaurants, though they might not use it every time they eat out. They suggested that this information could be presented in many locations in the restaurant including food wrappers, tray liners, brochures, on the take-away bags, posters near the counter, and the menu boards.
11. **Menu board information.** Participants reacted to multiple versions of a menu board for a typical fast food restaurant. In general, people liked having calories listed after meal items and after combo meals. Those who tend to order *a la carte* preferred to have calories listed after each item, while those who usually order a combo meal preferred to have calories listed for the entire meal. While participants were concerned with multiple macronutrients for foods, having just calories listed was enough for many people. They thought that calories could be a signal for the level of other macronutrients.
12. **Menu board section.** Most participants also reacted favorably to the idea of placing healthier options, including meals, in a separate section of the menu board so they could find healthier options at a quick glance.
13. **"Healthier" (keyhole) symbol.** Many also reacted favorably to the purple keyhole symbol for healthier meals, but some thought that the exact number of calories should be listed as well. Again, the symbol would have to be trusted and consumers would have to understand the meaning of the definition.

#### **Messages:**

14. There was no one message that participants universally thought was meaningful or liked. Different groups had different preferences, but many thought some message would be good reminders for them to look at the NFP, and also good for prompting children to

examine the label.

In summary, many consumers said they are very interested in nutrition information and they report using the NFP to help them determine what to buy and eat. They are interested in many different nutrients in addition to calories. In all the groups, participants felt that multiserving products that are commonly consumed at one sitting should be labeled as such. Many consumers said they are looking for labels that have uniform and realistic serving sizes and are interested in having nutrition information available to them at fast food restaurants.

Based on this preliminary analysis, these focus groups suggest some questions for future research:

- How many consumers use the %DV and how do they use it? Are there other ways to signal to consumers that a product is high or low in a certain nutrient? Is a healthy symbol on the front panel useful for consumers?
- Are there better ways to communicate serving sizes on the Nutrition Facts Panel?
- How do consumers react to nutrient content claims and health claims about calories on the front panel of packaged foods?
- Will nutrition information on restaurant menu boards or other locations change purchasing behavior?

## **2. Nutrition Information in Restaurant Menus: An Online Survey** **[Cristina McLaughlin]**

The restaurant industry, especially the chain restaurant industry, has used a variety of methods to inform the public about the nutritional characteristics of menu items, in response to current interest in the contribution of restaurant meals to the American diet. One information source is restaurant company web pages on the Internet. The National Restaurant Association website includes a bulletin highlighting chain restaurant menu offerings or information marketed towards healthy lifestyles (NRA 2003). Each of the 19 restaurant entries includes a short description of the health or nutrition-oriented menu feature, and a link to the specific restaurant web site. A systematic survey of restaurant web sites could provide an overview of available information, and could answer the following questions. What nutritional information is currently available to consumers on the Internet regarding menu items at major chain restaurants? Do restaurant web sites indicate the availability and format of nutrition information found at the restaurant locations? How are chain restaurants responding to current concerns about nutrition and obesity, as indicated by menu features and nutrient profiles on their web sites?

The purpose of this project is to survey restaurant web sites and compile a data base of nutrition information in restaurant menus available in the Internet. The list of restaurants was based on the top 100 United States restaurant firms by sales, obtained by searching Dunn & Bradstreet (2003). The top 100 firms identified in the search own a total of 125 restaurants and chains, including 71 casual dining, 28 fast food and 26 other (upscale, pizza delivery, buffets, etc). We reviewed the websites for each of the 125 restaurants or chains, and summarized the information in an Excel spreadsheet. The next step of the project will be to convert the tabulated information to an Access database.

Sample spreadsheet pages for the first 30 restaurants, ranked by total sales, are included in Appendix C. The spreadsheet provides the restaurant name and description followed by the site page (URL) address that includes the nutrition information or that brings us closest to it. The next columns summarize whether nutrition information is available on the site, and whether the information is interactive or in printable (pdf or html) format; reference to "Light" but no additional nutrition information; indication that nutrition information is available on premises and in what format (menu board, menu, tray liner, napkin, brochure, other); whether the nutrition information covers all menu items or partial or targeted items (such as dietary recommendations); and other information, including features marketed for healthy lifestyles.

Of the 125 restaurant web sites surveyed, 36 included nutrition information as either an interactive tool, such as a meal builder, a printable version or both. Of these, about 22 included printable versions only, 3 were interactive only and 12 provided both. Only 4 restaurant websites made reference to "light" items in their menu without additional nutrition information. The nutrition information, when available online, generally included calories and nutrients covered by nutrition labeling of packaged foods: calories, calories from fat, total fat, saturated fat, sodium, etc. A few websites, such as Wendy's and Au Bon Pain, even included information on trans fat. Although nutrition information was often available online, it was not clear whether similar information would be readily available at the point of purchase. Only a few websites indicated whether the nutrition information available online would be available on premises as well. Further exploration of this question would require actual physical visits to the restaurants.

Of the 36 restaurants with nutrition information on their websites, 11 provided both complete nutrition information on all menu items and recommendations for special dietary requirements. Overall, 17 offered nutritional information on their whole menu, and 28 restaurants offered nutrition information on some items such as "Most Popular" or recommended items. Although a number of restaurant web sites provide fairly complete nutrition information online, often the nutrition information was not closely tied to the online menus themselves. Many online menu pages displayed little or no overall emphasis on caloric intake or weight-management-related information. The nutrition information, when provided, was generally in a separate file from the online menu. A few online menus were available in a format that probably resembles the actual, on premises restaurant menu but none of these menus showed information on calories or fat.

In summary, many restaurants, but not a majority, provide some nutrition information on their websites. The nutrition information is often displayed separately from the menu web pages, and of course is also separate from the actual point of purchase of a restaurant meal. Restaurant web sites also provide anecdotal, qualitative information about featured menu items related to nutrition, calories or weight management. Some examples of healthy eating menu features are indicated in the Notes section of our spreadsheets (Appendix C) and summarized in the NRA web page overview (NRA 2003). For future research, we plan to expand our survey to include the top 100 fast food firms, convert the information to a relational (Access) database, and undertake a content analysis or other qualitative review of the restaurant web sites. This qualitative review will more fully describe the current status of restaurant initiatives to assist consumers with weight management.

### **3. Qualitative Investigation of Motivation for Food Product Reformulation [David Zorn]**

#### **Restructuring Consumers' Choices: Changing the Foods Offered to Consumers**



Since implementing the NLEA labeling regulations in 1993, FDA has learned the enormous importance to health and nutrition that comes by changing the supply of food. When labeling gave consumers information on certain nutrients that they should consume less of, their net reduction was on average about 1% (Levy et al 1985). Consumers who chose different products reduced consumption by more than 1%, but consumers who did not use the labeled information did not benefit from the labeling of a static product set. But if an existing product is reformulated to reduce its calorie content, then all consumers of that product benefit, even if they are not actively seeking to reduce calories. And new products with fewer calories may attract consumers other than those actively engaged in weight management.

Currently DHHS ASPE and FDA have paid a contractor to conduct confidential discussions with food manufacturers and restaurants to provide input on what FDA could do to encourage them to provide consumers with different food offerings to assist in weight management. Because this research is not yet complete, we are reporting initial findings here (Muth and Kosa, 2003). This preliminary summary provides information on discussions with seven food manufacturers and seven restaurant chains regarding the characteristics of food products and servings. Additional discussions are scheduled in the near future. Once all of the discussions are complete, the contractor will provide a formal report containing a full summary of the discussions and a description of the project background and the methods of the study, including the process for conducting the discussions (Muth and Kosa, 2003)

- **Label Prominence**

Manufacturers respond to required information depending on how prominent it is required to be on the label. For an earlier project, some manufacturers had indicated that they would only reformulate to reduce trans fat in margarine if information on trans fat was going to be prominently mentioned on the label, either by placing it on a separate line in the Nutrition Facts panel or by allowing nutrition content claims. (Honeycutt, et al., 1998). Currently, the signal on calories is weak relative to other signals on the label. Some manufacturers told us that:

- the Nutrition Facts panel should focus more on calories and perhaps be simplified.
- FDA should establish a seal related to weight management goals to give prominence to the issue. Other third party seals are very expensive to use.

- **Visual Cues**

We are learning that consumers use visual cues to judge their food consumption. Changing the packaging of products even with their existing formulations, would likely affect the amount of calories consumed.

- Some manufacturers suggest allowing single serving packages to contain only one serving rather than 2.5 servings; others suggested readjusting labeling serving size to represent the entire package or what people generally eat.

- **Dietary and Health Context**

It is important that consumers have a context for the information given to them. Currently, the Nutrition Facts panel gives calories only as a scalar number, with no

context at all for a complete diet. Some manufacturers suggest

- giving a daily value for calories, just as there is a daily value for almost every other macronutrient based on a 2000 calorie diet.
- development of one message on weight management common to all federal agencies.
- that consumers be educated about calorie balance, possibly illustrated by pictorials on packages to correspond to energy expenditure activity equivalent to the calorie content of the food.

- **Reformulation Factors**

Four key factors affect how favorable a food category is to being reformulated: cost of reformulation, consumer sensitivity to sensory changes in the product, consumer sensitivity to what is on the product label, and the competitiveness of firms within the food category. A labeling change required by FDA is most likely to result in reformulation when the combination of these factors favors the reformulation, such as for beverages, breakfast foods, dairy products, egg products, infant foods, seafood, soups, and weight control foods (Muth, et al., 2003). It may not be possible to influence reformulation of all foods. However, modest changes in food consumption can result in enormous improvements in public health.

- **Regulatory Policy**

Manufacturers suggested several areas where current regulatory policy is a barrier to reformulation

- The food additive approval process. One firm even supported user fees to fund a simplified and expedited review process. Improvements in the GRAS notification process have been helpful, but additional steps would encourage innovation. They especially mentioned faster review of artificial sweeteners, including cyclamate. Some manufacturers also recommended that FDA provide stronger advocacy and support for the use of fat and sugar substitutes.
- The claims approval process. Some firms want to be able to make factual nutrient content claims without disqualifying limitations relating to other nutrients, want less wordy claims, and they want the claim approval process expedited. Some manufacturers want to be able to label foods with 80-90 calories as low calorie because below this level it is difficult to provide enough nutrition; some want to be able to use "low carbohydrate" claims.
- The standards of identity and fortification policy. Allow fortification of reduced calorie products so that they can meet the standards of identity. For example, allow fortification of reduced calorie orange juice with folic acid.
- Standard calorie values for macronutrients. One manufacturer wanted calories from soluble fiber like oligofructose not to be included in the calorie count at the full 4 calories per gram.

- **Restaurants and Food Service Establishments**

Restaurateurs had the following suggestions.

- Educate consumers about appropriate portion size, caloric balance, eating wisely, and asking for customized orders to reduce calories.
- Educate consumers that small changes in diet can make significant differences for weight management. Restaurants would disseminate on bags, cups and tray liners.
- Educate consumers on using restaurant nutrition information that is increasingly available and be flexible on the format and placement of such information.
- Assist restaurants with analytical methods for foods.
- FDA and FTC need to be more flexible about comparative claims. Currently 20% caloric reductions can't be claimed but they are significant for weight management improvements.

In summary, discussions with manufacturers indicated some areas in which labeling policy and other regulatory policy could provide incentives or remove barriers to manufacturer initiatives to assist consumers with weight management. As noted above, these are preliminary results from the initial manufacturer discussions, which are still in progress. Note that these findings are based on qualitative research with small sample sizes, therefore, they should be viewed as suggestive, and not as representative or projectable to all manufacturers. In the near future, we will have information available on a complete analysis of the full set of discussions.

#### **4. Quantitative Social Sciences Model of Dietary and Weight Management Behaviors [Amber Jessup]**

Current social sciences literature and data sets contain a wealth of information about consumer decisions affecting weight, including attitudinal and behavioral factors related to exercise, food choice, food quantity, and frequency of eating. Realization of the full potential of this information to address public health questions about obesity will require intensive, systematic review and model-building. FDA, in collaboration with OASPE, is working with a contractor, ERG, to review the literature and build a model focused on food label use and weight management. The main components of the project include: an annotated bibliography and written literature review, theoretical and empirical (data-based) models of label use for weight management and a summary of future research needs.

The model will address important individual and environmental factors that can influence consumer dietary and weight management behaviors. In our review of literature in economics, psychology, nutrition, health behavior, and other social science disciplines we are identifying critical factors affecting motivation and execution, such as habit, risk perception, efficacy of behavior, availability of and access to nutrition and health information, and education. We are organizing information from selected articles in a structured, annotated bibliography with brief summaries of the article focus, economic/econometric model used, data source, statistical methodology, results, including a critical review of strengths and weaknesses, and relation to the modeling project. Examples of the annotated bibliography format are in Appendix B. We will next write a literature review synthesizing the conclusions about label use and weight management that can be drawn from the literature.

The theoretical model will be based on Grossman's theory of a household health production



function (Grossman 1972). In this framework, health is produced from a combination of time, purchased goods, and human capital. This approach is appealing because health is typically not a commodity that can be directly purchased, but results from a combination of lifestyle choices and purchases. Under the theory, the consumer maximizes his or her utility from health, leisure, and consumption of other goods, such as food. This model acknowledges that food may enter into consumers' utility function in multiple ways: directly, say, due to the pleasure of eating chocolate cake and indirectly, say, through the detrimental effects of chocolate cake consumption on health. Additionally, the consumer is constrained by both time and income. Information, in the form of labeling, may enter into his or her health production function by affecting the choice of foods and into his or her time constraint by reducing the time required to choose foods.

For building the empirical model, nationally-representative data on food choices, nutrient intakes, and diet and health-related attitudes and knowledge (including nutrition label use) are available from USDA's Continuing Survey of Food Intakes by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS), 1989-1991 and 1994- 96. To understand how consumers use labels to aid in managing their weight, we will model caloric intake as predicted by label reading. The independent or predictor variables will include other aspects of health, preferences and attitudes towards food and nutrition and demographic characteristics.

Because of the complex relationships among dietary knowledge and attitudes, label reading, and calorie consumption, there are limitations in the use of cross-sectional data, such as CSFII, to infer causal relationships between label reading and dietary choices. For example, consumers with high levels of knowledge and concern about nutrition are likely to eat a healthier diet than consumers that are unconcerned about nutrition. Consumers who are well informed about nutrition are also more likely to read labels and will be better able to use labels to guide their diet. Conversely, label reading may inform consumers about nutrition. For example, health claims may inform consumers about the relationship between diet and disease, or the presence of a macronutrient on the Nutrition Facts panel may signal to consumers that the macronutrient plays an important role in the diet. Thus, although some studies have using simple, single equation methods such as OLS or probit regressions to describe the relationship between label use and nutrient consumption (Neuhauser et al 1999, Kreuter et al 1997), this approach can establish a correlation between label use and diet, but does not establish a causal relationship.

Studies using more complex techniques, such as a two-stage Heckman selection model or an endogenous switching regression model, have attempted to control for the consumers' self-selection to use labels (Guthrie et al 1995, Kim et al 2000) However, neither of these studies focused on calories, a key dietary variable in weight control, and both studies controlled for self-selection of label reading by using data on nutrition knowledge and attitudes to predict label use. But these characteristics may also be the result of self-selection and therefore may not be suitable controls.

In order to overcome these problems, we will test the robustness of the independent association of label use and caloric intake using several modeling approaches, including a single equation multivariate model, a two-stage model, an endogenous switching regression model, and a model using the difference in label availability between waves of data. The latter approach exploits the implementation of the Nutrition Labeling Education Act (NLEA) in 1994, between waves of the CSFII and DHKS, to conduct a natural experiment of the effect of label changes on consumers. Differences in the effectiveness of label use between waves of the CSFII and DHKS, while

controlling for other observable factors, can be reasonably attributed to increased availability and standardization of labels.

This model will enhance understanding of the relationship of dietary behavior and consumer label use and of consumer characteristics that influence the effectiveness of label use. By considering relevant and important individual and environmental factors, this model can go beyond the existing literature to help identify the role that food labels play in health decisions. The model will provide information on the marginal benefits of label use on health and can be used in cost-benefit analysis of current labeling, of possible changes in labeling regulations, and of obesity-related policy issues at FDA and HHS.

We expect to use the model to test the effectiveness of policy interventions such as label changes, product reformulation, and educational messages. The data should also enable us to profile different groups of consumers who have different knowledge, attitude, and behavior; this information can also be useful in identifying and prioritizing intervention and education efforts. For example, the model will attempt to answer questions such as:

- Do food labels help consumers maintain their desired weight?
- Are less educated consumers less able to use food labels to maintain a healthy weight than more educated consumers?
- How does ethnicity and other cultural factors affect consumers ability to use the food label?
- How does mother's use of the food label affect the health of their children?

The model developed in this project will use existing data, such as the CSFII/DHKS, BLS price data, and supermarket scanner data. The project will also identify data gaps and recommend additional data collection and improvement of this social sciences model.

#### **IV. Future/Potential research projects for addressing weight management problems**

Although not finished, some preliminary observations can be made from our research so far. First, although consumers clearly use food labels, including health claims and the nutrition facts panel, the information may not yet be structured in a way to optimize understanding and use. Second, although our research has uncovered some information being offered in restaurants, consumers appear to want more information and in a more structured format. We have uncovered several promising formats including segregation of meals or logo indicators for low calorie or healthy alternatives. Finally, our research shows that manufacturers will respond to changes in labeling policies to reposition their foods to take advantage of information that is prominently required. These preliminary findings suggest some avenues of future research.

##### **1. Food Labels**

Research is needed to find out if there are ways to reformat the nutrition facts panel (NFP) to make it easier to use and to provide incentives for manufacturers to offer more lower calorie foods that are also healthier than the current selection. From the existing literature and from the preliminary reports from the current projects, some possible areas include:

- a. Daily values - either evaluate the effectiveness of an education campaign to see if people will start using these or possibly look for replacements to indicate whether nutrients are high or low. These replacements could be graphical devices or wording changes such as high or low.
- b. Serving sizes - Because consumers are having difficulty, either because of time or ability, with the multiplication necessary to calculate nutrient values consumed, consider replacing some or all nutrient information with total container information or nutrient density information.

Research is also needed to see how we can provide better signals on the front of the label, the principal display panel (PDP). Because consumers often do not look at the back of the label when there is a claim, and often take the claim to apply to the entire product, research is needed to see if FDA can provide an alternative signal that addresses the entire product. This may be an indicator of the healthiness of the product, such as the Swedish keyhole, or an indicator of calories in the product.

## **2. Restaurants**

Research is needed to evaluate the effectiveness of various kinds of nutrition labeling, including labeling calories and indicators of healthiness for both a la carte items and meals. Different kinds of labeling may work differently depending on the type of restaurants, e.g., quick serve versus family style restaurants. The desirability of some type of labeling was conclusive in qualitative research but more quantitative research may be necessary. Also, nutrition labeling in restaurants may not be able to be as precise as labeling for packaged products. It is not clear whether people would use nutrition information in restaurants in a different manner than they would for packaged food. Although there is some information provided to us by the Economic Research Service, it might be useful to more completely establish the link between overweight and the prevalence of eating out, both with respect to the types of restaurants and the socioeconomic characteristics of overweight consumers who eat out frequently. It may also be useful to know whether people who perceive themselves to be overweight in fact eat fewer meals in restaurants because of that fact and whether or not, if so, labeling would increase the number of meals eaten out.

Finally, we have a potential volunteer chain of restaurants that will use some of the information obtained from the focus groups to test in an actual market situation how consumers will react to this type of labeling. The final details are expected to be worked out in the next month or two.

## **3. Food Reformulation**

Some of FDA's existing policies for nutrition labeling, food standards and food additives may need to be examined to see if there are barriers to reformulating existing foods. In addition, changes that might be suggested to food labels or restaurant menu's should be evaluated to see how it would change the supply side of the market and increase the number of low calorie/healthy foods or meals offered.

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## **VII. Appendices**

- A. Review of Literature
- B. Sample Annotated Bibliography Entries
- C. Sample Pages from Spreadsheet of Restaurant Web Sites

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## **Appendix A. Review of Literature**

**Review of literature on nutrition labeling and restaurant point-of-purchase labeling**  
[Contributors to literature review: Amy Lando, Jordan Lin, Andrew Estrin, Amber



**Jessup, David Zorn, Clark Nardinelli]**

### **Nutrition labeling**

The Nutrition Labeling and Education Act (NLEA) (1990) gave FDA authority to require a Nutrition Facts panel on the label of most packaged foods. The Facts panel states the standardized serving size, the number of calories per serving and the amount and percent of the Daily Value (DV) per serving for specified nutrients. (The Daily Value is a reference amount for daily intake of a nutrient in a 2000 calorie diet.) Before NLEA, nutrition labeling was required only in certain instances, such as when claims were made about nutrient content.

In addition to the Nutrition Facts panel, FDA also permits specified nutrient content claims and health claims on food labels. FDA defines criteria for nutrient content claims, such as "low in fat" or "a good source of calcium". Health claims highlight a relationship between a food or nutrient and a disease or health-related condition, such as calcium intake and reduced risk of osteoporosis.

### **Social science research methods**

Before NLEA, FDA conducted consumer research about the usefulness of potential choices for the Facts panel format. Since NLEA, a number of researchers have studied how consumers use the Facts panel, nutrient content claims, and health claims (separately and in combination) to make dietary choices. Consumer research is used to assess people's knowledge, attitudes, perceptions, and preferences for a topical subject area or reactions to any type of stimuli. Depending on the the goals of the project, research methods may include qualitative data collection, quantitative surveys or experimental studies.

- In qualitative research, open-ended questions are used to elicit unstructured consumer reactions and thoughts to different topics or stimuli. Qualitative research, including the focus group format, is useful for obtaining the range of consumer opinions about a given topic and is often conducted as a preliminary step, before quantitative surveys or experimental studies. Unlike experimental studies or quantitative surveys, results from focus groups and other qualitative studies are not generalizable to any population.
- In quantitative surveys, information is collected by structured questionnaires and the resulting data categorized by demographic and other characteristics. When the survey sample is nationally representative, the results provide population estimates and the conclusions can be generalized nationally. Nationally representative surveys can help inform policy makers, risk assessors, and health educators of the knowledge, attitudes and self-reported behavior of the U.S. public about a certain topic.
- Experimental studies test consumer response to manipulated stimuli, such as real or hypothetical food labels that vary in format or content. Each respondent is randomly assigned to an experimental group that responds to a particular type of food label. The response of each group is recorded, and differences in response across groups are attributed to the corresponding experimental conditions or labels. Experimental studies can statistically test differences in consumers' understanding of and ability to use different label information and formats.
- Intervention studies are another type of experimental study. Intervention studies measure

differences in peoples' behavior when specific conditions are varied according to an experimental design. For example, intervention studies may examine purchasing behavior in grocery stores or eating behavior in restaurants in which different types or amounts of nutrition information are presented.

### **Food label use**

Research clearly shows that most Americans are familiar with and use the Nutrition Facts panel. In a 2002 FDA survey, 69 percent of the U.S. population reported using food labels often or sometimes when they buy a product for the first time (FDA, 2003). People reported using the food label for many reasons, most commonly to see how high or low the food is in calories and in nutrients such as fat, sodium, or certain vitamins.

Many consumers do not fully understand the information on the Facts panel, even as they use it to make dietary choices. One study suggest that percent DV information helps consumers judge the healthfulness of a food better than absolute amounts of nutrients alone (Levy, Fein, and Schucker, 1996). However, in a national survey (FMI, 1996) less than half of respondents could accurately identify the meaning of the percent DV for fat and another study found that DVs are not helpful for consumers to make correct judgments about the healthiness of a product (Barone et al, 1996)..

Some experimental food label studies have found that, when presented with nutrient content claims or health claims in the absence of the Nutrition Facts panel, consumers can be misled into thinking a product is healthier than it really is (Ford et al., Roe et al.). These misperceptions may be remedied if consumers also look at the Facts panel. For example, regardless of the fat and fiber claims on the front of packages with varying fat and fiber content, consumers who were asked to read the Facts panel could correctly identify a product as being low or high fat (Garretson and Burton). Varying the level of fiber made no difference in the consumers' perceptions of the healthfulness of the food. This suggests that fat is a more salient nutrient to consumers than is fiber. Similarly, regardless of their education level, consumers presented with the Facts panel could judge product healthfulness correctly even in the presence of an implied claim about heart health ("It Does Your Heart ♥ & Good!"). However, without the Facts panel, consumers were significantly more likely to be influenced and potentially misled by health claims (Mittra et al).

In the above studies, the research subjects were specifically directed to consult the Facts panel. However, in a study that gave respondents the option to look at any part of a food package, consumers did not look at the Facts panel to verify claim information, but truncated their examination to just the claim on the front of the package (Roe, Levy and Derby). This resulted in incorrect inferences about the product healthfulness, particularly about nutrients not mentioned on the front. Although more research in this area is needed, this study provides some evidence that consumers do not customarily verify front panel information by consulting the Nutrition Facts panel.

### ***Food label and diet***

Correlations between food label use and diet have been reported in a number of studies. For example, survey respondents who used the Facts panel were more likely to consume a lower fat diet, both in the general population and among family clinic patients (Neuhouser et al, Kreuter et al). Clinic patients with health conditions such as high blood pressure and high cholesterol were more likely to look on the label for sodium and cholesterol information, respectively (Kreuter et al).

A limitation in interpreting cross-sectional surveys about label use and diet is that consumers who are concerned about their diet may be more likely to read the nutrition label. Thus, although label reading may be correlated with healthy diet practices, the cause of the healthier diet may be the concern about nutrition, not the label reading. For example, in one study that found lower total fat intake among label users than non-users, consumers with higher fat intakes were less likely to search for fat information on the label and food label use was strongly correlated with attitudes toward food labels (Lin and Lee). In another study using statistical analysis to control for different characteristics of label users and non-users, food label users had lower average percent of calories from total and saturated fat, cholesterol, and sodium than non-label users (Kim, Nayga, and Capps).

In an intervention study using grocery store shelf labels with nutrition information, the nutrition shelf labels increased the purchase of healthier alternatives in some product categories, but decreased the purchase of healthier alternatives in other product categories (Teisl and Levy). The authors suggested that consumers might use an implicit health risk "budget" to compensate for eating healthier foods in some categories where taste differences among choices were small, by eating less healthy foods in categories that had greater taste differences among choices. The ability to make such choices could be beneficial to consumers, although not leading to overall improvements in diet. The results support the idea that providing nutrient information may allow consumers to more easily switch consumption away from "unhealthy" products in those food categories where differences in other quality characteristics are relatively small.

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### *Restaurant labeling*

In 1999, American households spent an average of \$2,116 or 42 percent of their total food expenditure on food away-from-home (BLS 1999). According to the latest data, during 1994-6, away-from-home food, especially from restaurants and fast food locations, contributed 32 percent of daily intakes of energy calories, 32 percent of added sugars, and 37 percent of fat (ERS 2000). Thus, food away-from-home is an important part of American diets and more informed dietary choices away-from-home can potentially help reduce the risk of health problems such as obesity. Nutrition labeling on menus, including the use of claims and symbols, is one way to help consumers make more informed dietary choices. The effectiveness of labeling, however, depends largely on how consumers respond to the measure. Although the NLEA does not mandate restaurant nutrition labeling, there is a body of research that has investigated consumer responses to nutrition labeling on food away-from-home.

A number of experimental studies have examined consumer behavior in cafeteria, restaurant and vending machine settings in response to nutrition information or health messages. The results of these studies are mixed; differences in results among studies may be due to differences in experimental designs, including size of sample, demographic characteristics of participants, experimental setting, length of study, type of nutrition information or health message and type of behavioral outcome studied.

In a British college cafeteria, display of calorie and nutrient content of food items on the menu board had a negative effect, resulting in higher calorie and fat intake at lunch (Aaron et al 1995). The differences were greater for males and for less restrained eaters. The authors stated that the results indicate the importance of assessing the motivational choices of potential recipients of nutrition education programs. A second study in a British sit-down restaurant with a limited menu found fewer participants selected an entrée marked as a lower fat option, although the difference was not statistically significant (Stubenitsky et al ). However, those selecting the lower fat entrée had lower calorie and fat intake both from the entrée and from the complete lunch. Sensory expectations and post-meal acceptance measures were similar for the entrée in its regular or lower fat version, both when the lower fat version was labeled and when it was unlabeled.

In a cafeteria for the general public, prominent labeling of certain items as "lower caloric selections" had no effect on calories eaten or perceived calories eaten, either among restrained eaters (dieters) or unrestrained patrons (Johnson et al 1990). Restrained eaters did choose lower caloric meals, but their choices were not related to the presence of the "lower caloric selection" label. In a college cafeteria, changes in the proportion of patrons choosing items from various food groups resulted from labeling the caloric content of food items, highlighting healthier choices with a symbol, or providing tokens for monetary incentive for healthier choices (Cinciripini). Changes in food group selection with labels or tokens were different for males and females and for lean, normal or obese participants. Overall, calorie labeling decreased the selection of starchy foods and red meat items; healthier selection labeling with incentive tokens increased the selection of vegetables/soup/fruit/lowfat dairy, chicken/fish/turkey and salads and decreased the selection of high fat/dessert/sauces. In a family-style, table-service restaurant, special healthful entrees were highlighted by rotating messages: a nonspecific message, a healthfulness message and a taste plus healthfulness message (Colby et al). Sales of the healthful chicken or tuna entrees were higher when the taste plus health message was used than with the health alone message.



One recent study compared the effect of health messages and lowered prices, separately and together, on the purchase of healthy food items in a counter-service, delicatessen-style restaurant (Horgen and Brownell 2002). Price decreases alone, rather than a combination of price decreases and health messages, were associated with increased purchases of some healthy food items over a 4-month period. The authors suggested that health messages may have paradoxical effects if foods labeled as healthy are assumed to taste bad.

Restaurant patrons at a table-service restaurant for university students and staff indicated their labeling preferences among menus using an apple symbol to highlight healthy selections, menus using colored dots to highlight specific nutrition guidelines, or a leaflet listing numeric values for nutrient content (Almanza and Hsieh). Both the apple symbol and the leaflet were preferred over the colored dots, and were considered more attractive, less time-consuming and easier to use. The apple symbol was preferred over the leaflet by women patrons and those younger or less educated. However, this study did not examine whether patron labeling preferences were related to consumption behavior. Previous FDA research has suggested that label format preference does not necessarily equate to format effectiveness (Levy, Fein, and Schucker 1992).

An experimental study, conducted by mail using a consumer household research panel of primary food shoppers, found interactions between the effects of a heart disease claim and a Nutrition Facts panel on either a package for a frozen lasagna entrée or a menu listing a lasagna entrée (Kozup, Creyer, and Burton 2003). When no nutrition information was present and there was a heart disease claim on the package or menu, subjects thought that regular consumption would reduce the risks of heart disease and stroke, and the claim had a positive effect on their attitudes toward the food, its healthiness, and intention to purchase the food. Regardless of presence or absence of the heart disease claim, better nutrient content had a positive effect on perception of the food's relationship to heart disease risk as well as a positive effect on attitude toward the food, the healthfulness of the food and intention to purchase. Poorer nutrient content had corresponding negative effects. Addition of the claim to positive nutrition information further increased the perception of reduced heart disease risk, but did not increase other positive attitudes compared with nutrition information alone. Addition of the claim to negative nutrition information (inconsistent with the claim) had no effect on product evaluations and led to a negative impression of the credibility of the manufacturer or restaurant marketing the food. In a further experiment, evaluations of a menu item were affected by alternative items presented. If the nutrition information of alternative items was more favorable, then the evaluations of the item were less positive, and vice versa. This suggests that the alternative or nontarget menu items served as a reference for the target items. If the nutrition information of alternative items was present, then the positive effect of the heart disease claim was limited to perception of the food's reduction of heart disease risk.

Practical problems in restaurant labeling and obstacles to labeling as reported by large restaurant chains have been reviewed (Boger 1995, Almanza 1997). Problems include the fact that NLEA guidelines were developed for packaged foods, not restaurant food, with respect to serving sizes and criteria for health and nutrient content claims; different sized portions for lunch and dinner; variability of menu item from day to day. A suggestion for further research was whether consumers use nutrition information on packaged foods differently than in restaurants (Almanza 1997).

In summary, consumers have mixed reactions to nutrition information in cafeterias and restaurants. Both health claims and listing of nutrition information have been found to be

capable of producing positive influences on consumer evaluations of menu items and the influences appear to be strongest when nutrition information about alternative menu items is absent. Although nutrition information may influence choices and attitudes, other factors may be more salient: whether the respondent is on a diet, attitudes toward nutrition, price of food, health claim vs. nutrition information, taste/perceived taste.

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### **Restaurant studies from the Economic Research Service**

An analysis of studies received from the USDA Economic Research Service (their own and others) show that eating away from home, particularly increasing consumption in fast food restaurants, is correlated with increases in BMI. Further, the per capita number of restaurants in a state was positively related to individual's BMI and the probability of being overweight. These studies are summarized in the following charts, used courtesy of USDA ERS.



**Question 1 (and 4): Correlations between BMI and Consumption of Foods Away From Home**

Author(s)	Source	Title	Data Source	Dependent Variable	Estimated Effect of FAFH-Specific
Binkley, Eales, and Jekanowski	International Journal of Obesity (2000) 24, 1032-1039	"The relation between dietary change and rising US obesity"	CSFII 1994-1996	BMI	The average man who was 1.77m tall and consumed restaurant food was .9 kg heavier than those who did not eat at a restaurant. If he consumed food at FF places, he was .8 kg heavier. The average women who was 1.63m and consumed restaurant food weighed .2 kg more than a woman who did not consume FF.
Lin, Huang, and French	Submitted to the International Journal of Obesity	"Women's and Children's Body Mass Indices"	1994-1996 and 1998 CSFII	BMI	All Women: a 1% increase in FAFH was associated with an 1.28 point increase in

					BMI. For high income women, this was associated with a 1.63 point increase in BMI
Chou, Grossman, and Saffer	"An Economic Analysis of Adult Obesity: Results from the behavioral risk factor surveillance system."	NBER: Working Paper 9247 <a href="http://www.nber.org/papers/w9247">http://www.nber.org/papers/w9247</a>	1984-1999 BRFSS	Reported and Adjusted BMI	Increasing the number of restaurants was estimated to increase BMI by 1.7% and increase the probability of being obese (PO) by 9%. Increasing the price of fast, restaurant and home food was estimated to increase BMI by .5, .2 and .35% respectively.

					These prices were estimated to increase the PO by 4, .7 and 3%
Kuchler and Lin	"The Influence of Individual choices and attitudes on adiposity"	International Journal of Obesity (2000) 26	CSFII 1994-1996	BMI	All respondents: a 1% increase in FAFH was associated with an .93 point increase in BMI. For women, this was associated with a 1.24 point increase. No significant increase for men
Variyam	No title	ERS Presentation	NHANES I Follow-up study	BMI	Among the individuals who consumed <=10% of cals away-from-home, 34.2% of healthy weight became overweight over a 20-year period and 28% went from overweight to healthy weight.

**Question 2: Are Calories From Foods Purchased Away From Home More Dense?**

Author (s)	Source	Title	Data Source	Note	Dependent Variable	Calories	Fat
Lin, Guthrie, and Frazao	FoodReview, Volume 24, Issue 2	"American Children's Diets Not Making the Grade"	NCFS 1987-1988 CSFII 1994-96	See Attached Chart			
Lin, Guthrie, and Frazao	ERS Service Report	"Away From Home Foods Increasingly Important to Quality of American Diet"	NCFS 1987-1988 CSFII 1994-96	See Attached Chart			
Mancino	PhD Thesis	"American's Food Choices: The Interaction of Information, Intentions, and Convenience	CSFII 1994-1996		Per Meal Caloric Intake and Per Meal Percent of Calories From Fat	Evaluated at the sample means and using the RDI, a man who ate a meal from home, a restaurant, or a fast food restaurant consumed an average of 807, 1097 and 1041 calories at that meal. A woman consumed 503, 702, and 664 calories, respectively	Evaluated at the sample means an individual who at a meal from home, a restaurant, or a fast food restaurant consumed an estimated 24, 30, and 32 percent of his or her calories from fat
Variyam	In the works	Are Nutrition Labels Effective	CSFII 1994-1996			After adjusting for other factors, at-home food	

						is between 360 to 540 calories/kg less dense than FAFH	
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**Comparison of Total Calories and Caloric Density of Foods Prepared At Home and Food P**

	1987-1988						1995		
	Average Intake	Benchmark	At Home	Away From Home	Restaurant	Fast-Food	Average Intake	Benchmark	A Ho
<b>Calories</b>	1876	*	1369.48	506.52	93.8	93.8	2043	*	1348
<b>Percent of Calories From Fat</b>	37	30	36.3	38.7	41.3	39.7	33.6	37	30
<b>Percent of Calories from Saturated Fat</b>	13.8	10	13.5	14.7	15.5	15.4	11.5	10	10.9
<b>Milligrams of Cholesterol per 1000 calories</b>	286	166	161	151	215	138	268	147	129
<b>Milligrams of Sodium per 1000 calories</b>	1672	1328	1678	1656	1824	1575	1637	1175	1630
<b>Grams of Fiber per 1,000 calories</b>	7	10.7	7.5	5.8	5.8	5	7.4	10.4	8.1
Sample: Non pregnant, non-lactating individuals over the age of 2							Source: Lin, Guthrie, and F		

**Comparison of Total Calories and Caloric Density of Foods Prepared At Home and Food Pre  
 (Cont.)**

	1987-1988					1994-1996		
	Average		At	Away		Fast-	Average	At

	Intake	Benchmark	Home	From Home	Restaurant	Food	Intake	Benchmark	Home
Percent of Total Calories			80	20	11	2	*	*	68
Percent of Calories From Fat	35.93	30	35.2	38	40.5	38.8	32.99	30	31.6
Percent of Calories from Saturated Fat	13.39	10	13	14.5	15.2	15.2	12.01	10	11.5
Milligrams of Cholesterol per 1000 calories	143	170	149	129	176	125	115	153	118
Milligrams of Sodium per 1000 calories	1616	1363	1637	1561	1674	1484	1575	1222	1570
Grams of Fiber per 1,000 calories	6.4	8.2	6.6	6.2	5.2	4.9	6.7	7.3	6.9
Sample: Children aged 2-17							Source: Lin, Guthrie, and Fra		

## Appendix B. Sample Annotated Bibliography Entries

**Authors:** Kim, Sung-Yong, Rodolfo M. Nayga, Jr., and Oral Capps, Jr.

**Date:** July 2000

**Title:** The Effect of Food Label Use on Nutrient Intakes: An Endogenous Switching Regression Analysis

**Citation:** *Journal of Agricultural and Resource Economics* 25(1): 215-231.

**Relevance:** HIGH

## **Focus**

Kim et al. (2000) look at the impact that use of nutrition labeling has on five nutrient intakes (calories from total fat, calories from saturated fat, cholesterol, dietary fiber, and sodium). They use data from the 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS). They control for self-selection to use labels with an endogenous switching regression model. Use of the endogenous switching regression model allows them to also look at factors that influence label usage.

## **Data**

As noted, the data comes from the 1994- 1996 CSFII and DHKS. They use observations on 5,203 individuals that completed both the day-1 and day-2 surveys and that had complete data otherwise. No indication is given of the sample size relative to the total sample.

In forming the variable that measures label use, they convert a four-point scale to a binary yes/no variable. Respondents were asked about their frequency of label use for each of the five nutrients studied in the analysis. They were given four response options: "often," "sometimes," "rarely," and "never." Kim et al. convert "often," "sometimes," and "rarely" responses into "yes" answers and "never" responses into "no" answers. This differs from the mapping used by Guthrie et al. (1995).

## **Statistical Methodology**

The switching regression framework employed by Kim et al. is a standard application of this method. Maddala (1983, Section 8.3) provides a treatment of this method. In brief, the model involves estimating separate regressions for label users and non-users for each of the five nutrients. A third equation that uses the label use decision as a dependent variable is also estimated. The three equations (nutrient intake for label users, nutrient intake for label non-users, and the decision to use labels) are not independent and have non-zero correlations across the error terms. The system is estimated using full information maximum likelihood.

To estimate the impact that food labels have on nutrient intakes, Kim et al. follow a standard method employed in switching regression models. First, they calculate the predicted values for nutrient intakes for label users. This is done for each nutrient using the label user equation. Next, they calculate the predicted values of nutrient intakes for label users using the label non-users' equation. That is, they take the label users and generate predicted values for nutrient intakes using the label non-users equation. The difference in the mean values of these predicted values represents the impact of label use on nutrient intake.

## **Results**

The results of their statistical analyses indicate that label use has beneficial impacts for each nutrient. The use of labels is associated with:<sup>(28)</sup>

- A 16.1 percent decrease in the intake of calories from fat;
- A 15.1 percent decrease in the intake of calories from saturated fat;



- A 21.0 percent decrease in the intake of cholesterol;
- An 87.1 percent increase in the intake of dietary fiber; and
- A 0.9 percent decrease in the intake of sodium.

None of the estimated impacts were judged for their statistical significance, even though this is possible in a switching regression model.

Kim et al.'s analysis also look at the factors that influence label use. They find that income, education, a good knowledge of diet-health issues, being on a special diet, exercising regularly, and being the family meal planner are all positively associated with label use. Factors that are negatively associated with label use include: household size, age, being male, living in a non-metropolitan area, using food stamps, and being a smoker.

### **Relation to CFSAN Study**

This study is **highly relevant** for the CFSAN study.

- The study focuses on the same issues that the CFSAN study will look at: how does use of labels affect nutrient intakes and what factors influence use of labels.
- The study uses the same data that will be used in the CFSAN analysis.
- We anticipate use of a similar method as is used in this analysis.

### **Comments**

- The study looks at five nutrient intakes, which are likely to be related to one another. The method, however, does not attempt to account for any cross-equation relationships. We suggest that a seemingly unrelated regression (SUR) framework be investigated for use in combination with this method to capture cross-equation relationships.
- The use of a binary variable for label use may be too simplistic. We expect that more than three categories can be specified: "always uses labels," "sometimes or rarely uses labels," and "never uses labels." This would complicate the switching regression framework, but not to an unmanageable degree. This would also allow CFSAN to look at how influencing consumers that are "never" users to become "sometimes" users would affect nutrient intakes. Additionally, CFSAN could look at how influencing "sometimes" users to become "always" users would affect nutrient intakes.
- The statistical method does not appear to account for sampling weights.
- Restricting to respondents that are in both the day-1 and day-2 survey may result in sample selection that is uncontrolled by the switching regression framework.

### **Closely Related**

Guthrie et al., 1995

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**Authors:** Guthrie, Joanne F., Jonathan J. Fox, Linda E. Cleveland, and Susan Welsh

**Date:** July-August 1995

**Title:** Who Uses Nutrition Labeling, and What Effects Does Label Use Have on Diet Quality?

**Citation:** *Journal of Nutrition Education* 27(4): 163-172.

**Relevance:** HIGH

### **Focus**

Guthrie et al. (1995) look at the impact of the use of food labels on the intake of 26 food components (e.g., protein, total dietary fat, etc.). They use data from the 1989 Continuing Survey of Food Intakes by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS). They control for self-selection to use labels with Heckman's self-selection model. As part of their analysis, they also examine factors that influence the use of food labels.

### **Data**

The study uses data from the 1989 CSFII and DHKS. Their sample consists of 1,901 individuals that responded to the DHKS portion of the survey. The 1989 CSFII was designed to collect three days of food consumption data from respondents. The first day was (day-1) was collected using the 24-hour recall method (i.e., "What did you eat in the last 24 hours?"). The second and third day data were collected through a 2-day food record. Guthrie et al. only use the day-1 data in this study. They note that 1,548 respondents (of the 1,901 that completed the DHKS) submitted a full three days of food consumption data. Their reason for using the day-1 data only is to maintain sample size.

The study uses sampling weights in the statistical analysis, when appropriate. The sample design for the CSFII/DHKS calls for over-sampling of low-income households. Thus, the use of sampling weights in the analysis controls for the survey design.

In forming the variable that measures label use, Guthrie et al. convert a four-point scale into a binary yes/no variable. Respondents were asked about their frequency of label use for each of the five nutrients studied in the analysis. They were given four response options: "often," "sometimes," "rarely," and "never." Guthrie et al. convert "often" and "sometimes" responses into "yes" answers and "rarely" and "never" responses into "no" answers. This differs from the mapping used by Kim et al. (2000).

### **Statistical Methodology**

The authors follow Heckman's standard model of self-selection to generate the coefficient estimates. In their analysis, individuals self-select to use nutrition labels. They first estimate a probit model for label use and then calculate the inverse mills ratio for each individual in the data. The inverse mills ratio is then added to the regression models that use the 26 food components as dependent variables. They estimate only one label-use equation rather than one for each food component. This differs from the Kim et al. (2000) study, where a separate label

use equation was estimated for each of the five nutrient intakes investigated.

The basic regression equation for the food components regresses the amount of the food component on a set of explanatory variables that includes a zero-one binary variable for label use. The addition of the inverse mills ratio to the equation controls for self-selection to use labels.

One interesting aspect of this study is its use of principal components analysis (PCA) to pare down the number of variables that reflect individuals' "attitudes and values" that guide them in making food choices. The DHKS asks a number of questions regarding the individuals' preferences for either avoiding or ensuring the consumption of various food components. Inclusion of all of these variables in a regression framework would lead to significant multicollinearity. Using PCA, the authors are able to reduce the number of variables that reflect food choice values to two factors, thereby overcoming the multicollinearity problem.

## **Results**

In the article, the authors only present the estimated coefficient for the zero-one binary variable for label use and the coefficient for the inverse mills ratio rather than the full regression model results (26 equations). For the 26 equations, only two show a significant impact of label use: higher intake of Vitamin C and lower intake of cholesterol. Additionally, self-selection only appears to be an issue for Vitamin C and cholesterol intakes.

## **Relation to CFSAN Study**

This study is **highly relevant** for the CFSAN study.

- The study focuses on the same issues that the CFSAN study will look at: how does use of labels affect nutrient intakes and what factors influence use of labels.
- The study uses the same, but earlier, data that will be used in the CFSAN analysis.
- We anticipate use of a similar method as is used in this analysis.

## **Comments**

- The study looks at 26 nutrient intakes, which are likely to be related to one another. The method does not attempt to account for any cross-equation relationships. We suggest that a seemingly unrelated regression (SUR) framework be investigated for use in combination with this method to capture cross-equation relationships.
- The use of 26 nutrient intakes is very broad. It appears that this restricts what they can say on any one nutrient intake.

The study's use of a binary variable for label use may be too simplistic. We expect that three categories can be specified: "always uses labels," "sometimes or rarely uses labels," and "never uses labels."

- Restricting the sample to the day-1 data only may influence the results to an unknown

degree. The use of day-1 data only was based on maintaining sample size. Restricting the sample to individuals with three days of data may also result in bias, however. Nevertheless, it may be possible to develop a panel analysis (individuals over days) that accounts for sample attrition (i.e., individuals that do not provide day-2 or day-3 data). This would expand the nutrient intake data.

- The results are not convincing that labels influence diet. Only two of the 26 food components, or eight percent of the regressions, have a significant coefficient for label use. At a five percent level of significance we can expect to be "wrong" about a statistical inference five percent of the time. This set of results comes close to that critical cut-off. More convincing results would involve a significant coefficient in one-third or more of the regressions.
- Not providing the full regression results limits our ability to fully assess this study. It would be interesting to see the signs and significance of all other variables included in the analysis.

### Closely Related

Kim et al. (2000)

## Appendix C. Sample Pages from Spreadsheet of Restaurant Web Sites

Sample Page One from Spreadsheet of Restaurant

Restaurant number	Name	Description	Website
1	McDonald's	Fast Food	<a href="http://www.mcdonalds.com/countries/usa/food/nutrition/cate">http://www.mcdonalds.com/countries/usa/food/nutrition/cate</a>
2	KFC	Fast Food	<a href="http://www.yum.com/nutrition/menu.asp?brandID_Abbr=2">http://www.yum.com/nutrition/menu.asp?brandID_Abbr=2</a>
3	Pizza Hut	Casual Dining	<a href="http://www.yum.com/nutrition/documents/ph_nutrition.pdf">http://www.yum.com/nutrition/documents/ph_nutrition.pdf</a>
4	Taco Bell	Fast Food	<a href="http://www.yum.com/nutrition/menu.asp?brandID_Abbr=5">http://www.yum.com/nutrition/menu.asp?brandID_Abbr=5</a>
5	A&W	Fast Food	<a href="http://www.yum.com/nutrition/menu.asp?brandID_Abbr=4">http://www.yum.com/nutrition/menu.asp?brandID_Abbr=4</a>
6	Long John Silver	Fast Food	<a href="http://www.yum.com/nutrition/menu.asp?brandID_Abbr=3">http://www.yum.com/nutrition/menu.asp?brandID_Abbr=3</a>
7	Au Bon Pain	Fast Food	<a href="http://www.aubonpain.com/">http://www.aubonpain.com/</a>

8	RED LOBSTER	Casual Dining	<a href="http://www.redlobster.com/homeflash.asp">http://www.redlobster.com/homeflash.asp</a>
9	Olive Garden	Casual Dining	<a href="http://www.olivegarden.com/ourmenus/garden_fare.asp">http://www.olivegarden.com/ourmenus/garden_fare.asp</a>
10	Bahama Breeze	Casual Dining	<a href="http://www.bahamabreeze.com/food.html">http://www.bahamabreeze.com/food.html</a>
11	Smokey Bones Bar-b-q	Casual Dining	<a href="http://www.smokeybones.com/menu/sb_menu.pdf">http://www.smokeybones.com/menu/sb_menu.pdf</a>
12	Starbucks	Coffee shop	<a href="http://www.starbucks.com/retail/nutrition_freshfood.asp">http://www.starbucks.com/retail/nutrition_freshfood.asp</a>
13	Chili's Grill & Bar	Casual Dining	<a href="http://www.chilis.com/menu/default.asp?catID=7&amp;tierID=252E0006&amp;menuType=Dine+In">http://www.chilis.com/menu/default.asp?catID=7&amp;tierID=252E0006&amp;menuType=Dine+In</a>
14	Romano's Macaroni Grill	Casual Dining	<a href="http://www.macaronigrill.com/menu/default.asp?Unit_ID=002E0079&amp;tierID=18&amp;menuType=Lunch&amp;menu=1">http://www.macaronigrill.com/menu/default.asp?Unit_ID=002E0079&amp;tierID=18&amp;menuType=Lunch&amp;menu=1</a>
15	On The Border Mexican Grill & Cantina	Casual Dining	<a href="http://www.ontheborder.com/menu/default.asp?catID=&amp;tierID=2E710%2E0001&amp;state=VA">http://www.ontheborder.com/menu/default.asp?catID=&amp;tierID=2E710%2E0001&amp;state=VA</a>
16	Maggiano's Little Italy	Casual Dining	<a href="http://www.maggianos.com/menu/default.asp?Unit_ID=001">http://www.maggianos.com/menu/default.asp?Unit_ID=001</a>
17	Corner Bakery Cafe,	Fast Food	<a href="http://www.cornerbakery.com/default.asp">http://www.cornerbakery.com/default.asp</a>
18	Cozymels Coastal Mexican Grill	Casual Dining	<a href="http://www.cozymels.com/menu/default.asp?Unit_ID=001%2E0033&amp;tierID=16&amp;menuType=Dine+In&amp;menu=1">http://www.cozymels.com/menu/default.asp?Unit_ID=001%2E0033&amp;tierID=16&amp;menuType=Dine+In&amp;menu=1</a>
19	Big Bowl Asian Kitchen	Casual Dining	<a href="http://www.bigbowl.com/menu/BIGBOWL_Menu_VA.pdf">http://www.bigbowl.com/menu/BIGBOWL_Menu_VA.pdf</a>
20	Rockfish Seafood Grill.	Casual Dining	<a href="http://www.rockfishseafood.com/">http://www.rockfishseafood.com/</a>
21	Wendy's	Fast Food	<a href="http://www.wendys.com/food/index.jsp">http://www.wendys.com/food/index.jsp</a>
22	Sbarro	Fast Food	<a href="http://www.sbarro.com/">http://www.sbarro.com/</a>
23	Krispy Kreme	Coffee and Doughnuts	<a href="http://www.krispykreme.com/nutri.pdf">http://www.krispykreme.com/nutri.pdf</a>
24	Outback Steakhouse	Casual Dining	<a href="http://www.outback.com/menu/menuprinterfriendly.asp">http://www.outback.com/menu/menuprinterfriendly.asp</a>
25	Flemings Steak	Casual	<a href="http://www.flemingssteakhouse.com/sides.html">http://www.flemingssteakhouse.com/sides.html</a>

	House	Dining	
26	Roy's	Upscale	<a href="http://www.roysrestaurant.com/docs/about_frames.html">http://www.roysrestaurant.com/docs/about_frames.html</a>

Sample Page Two from Spreadsheet of Restaurant Web Sites

Restaurant number	Nutrition Info available in restaurant *						nutrition info coverage		Notes
	menu board	menu	tray	napkin	brochure	other	all items	info on partial or targeted items	
1					yes			yes	nutritional info for most popular items, food exchanges and recommendations
2							yes	yes	Additional healthier options menu
3							yes	yes	Info on healthier choices
4							yes	yes	Additional info on Fresco or lower cal stuff
5							yes	yes	Info on healthier choices
6							yes	yes	Lower calorie suggestions--leave out the sour cream or tartar sauce, etc.
7							yes	yes	Interactive Menu, lots of info and special nutrition info.
8									Online menu with no nutrition info
9		yes						yes	nutrition info on Garden Fare stuff only.
10									Online menu with no nutrition info

11									Online menu with no nutrition info
12					maybe				
13		yes						yes	Guiltless Grill menu (in restaurant has fat but no calorie info)
14									Online menu with no nutrition info
15									Online menu with no nutrition info
16									Online menu with no nutrition info
17									Online menu with no nutrition info
18									Online menu with no nutrition info
19									Online menu with no nutrition info
20									Online menu with no nutrition info
21					maybe		yes	yes	Interactive Menu, lots of info and special nutrition info.
22									Under construction -menu not available
23									Hard to find nutrition page. Uses packaged food format for labeling nutrition info
24									
25									Online menu with no nutrition info
26									Online menu with no nutrition info



(28) Estimated percentages reflect our conversion of results reported in Table 5 of the paper to percentage numbers. In calculating these, we divided the "Before Using Nutrition Label" column by the "Net Change" column for the "Average Nutrient Intakes."

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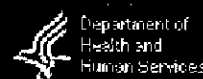
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## Appendix H - Developing Effective Consumer Messages

### The Food and Drug Administration's (FDA) Obesity Working Group Report

Effective consumer health messages about weight management and obesity prevention should be research-based and take into account the values, beliefs, motivations, needs and behaviors that comprise the "consumer reality" of the target audience. It is important that these messages be clear, simple, and understandable and do not undermine the credibility and impact of public health agencies.

There are six key questions to consider when developing research-based messages that encourage knowledge utilization:

1. What is the purpose?
2. Who is the target?
3. What is the promise (i.e., motivators)?
4. What is the support?
5. What is the image?
6. Where are the best opportunities for delivering the messages?

In determining the target audience(s) for research-based messages, it is important to consider that communication theory holds that more direct, population subgroup-focused messages typically have greater impact than messages that address a wider audience (e.g., the general public). At the same time, overweight and obesity have been identified as a national health problem, so it seems important to develop focused messages that affect large population subgroups.

Among private sector organizations, IFIC has been prominent in recent efforts to develop effective nutritional messages. IFIC uses a five-part system (Borra *et al.*, 2003):

1. Defining the relevant issues
2. Developing the initial message(s)
3. Examining candidate messages in focus groups
4. Refining the messages
5. Validating the messages in quantitative surveys

IFIC has drawn a number of conclusions from its efforts, many of which are supported by other

researchers (Marietta *et al.*, 1999; Kennedy and Davis, 2000; Borra *et al.*, 2001; Patterson *et al.*, 2001; Balasubramanian and Cole, 2002; Ikeda *et al.*, 2002; Gans *et al.*, 2002; Borra *et al.*, 2003; Gans *et al.*, 2003; IFIC 2003):

1. Consumers will not react positively to messages unless the messages set forth concrete goals that consumers view as achievable.
2. Consumers perceive general nutrition guidelines as too abstract and requiring too much planning and calculation to translate into action.
3. Consumers are receptive to messages that make direct, concrete suggestions and therefore provide tools with which consumers may exercise choice. Consumers resist being told what they must do.
4. Goals should be incremental rather than monolithic so that consumers can receive continuous positive feedback. Concrete and incremental goals sustain and reinforce consumers' desire for autonomy. Equally important is that setting and achieving incremental goals provides more opportunities for reinforcement (both self and external), which is important for sustaining positive behaviors. Consumers view monolithic goals as unrealistic because they would have to make substantial changes in diet and habits.
5. Overemphasis on one or a few nutritional components of a diet may impede the overall goal of achieving a healthy, varied diet.
6. Health and nutrition messages should be developed with an awareness of the varied cultural backgrounds found among the American public; different ethnic and cultural groups exhibit different dietary patterns and practices.

In qualitative studies, consumers claim they do not wish to spend a significant amount of time reading and comprehending labels. This is borne out by the fact that many use health or nutrient content claims as indicators as to the overall quality of the product and do not check the nutrition facts panel on the back (Roe, *et al.*, 1999). Also, consumers appear to be confused by serving sizes, particularly by multiple servings listed on small packages, as well as by the %DV listed in the nutrition facts panel. Consumers use food labels for multiple reasons, including diet plans and pre-existing health conditions such as diabetes and heart disease, and look for macronutrients of concern. On the other hand, taste, convenience, price, mood and family preferences influence purchases and are often at odds with healthy eating. Such factors present challenges for developing effective messages.

Other findings indicate that adults do not like "diets" and do not believe they work over the long term (Borra *et al.*, 2003). They also question whether there is any new nutrition information that they will find useful. Also, the qualitative studies found that encouraging parents and children to work together resonated, as did messages promoting better appearance<sup>(29)</sup> and self-esteem. Consumers need to hear new kinds of information, or a re-packaging of old information in new and relevant ways, that will serve as "motivation to jumpstart new thinking and behaviors."

**Notes:**

<sup>29</sup> At this time, FDA does not intend to use "better appearance" as a motivator for any of its obesity messages, given the larger concern about the effect such a focus may have on those with eating disorders (e.g., anorexia and bulimia).

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## Counting Calories Report of the Working Group on Obesity

# Appendix I Power of Choice

### Table of Contents

The Power of Choice is an after-school program developed jointly by FDA and USDA's Food and Nutrition Service. The materials guide pre-teens toward a healthier lifestyle by motivating and empowering them to make smarter food and physical activity choices in real-life settings. A Leader's Guide, containing ten sequenced interactive sessions engage adolescents in fun activities that develop skills and encourage personal development related to choosing foods wisely, preparing foods safely, and reducing sedentary behaviors. Most activities require little or no pre-planning and are simple to do. The Leader's Guide also includes easy snack recipes, 170 Nutrition Facts cards, and posters on four key topics, and a computer disk provides supplemental activities to each of the 10 sessions, a self-training video for the leader, community support suggestions, and much more.

Current status: Currently, the Power of Choice is being distributed either in hard copy or it can be downloaded on the Team Nutrition Web site, USDA's Food and Nutrition service (<http://www.cfsan.fda.gov/~dms/lab-poc.html>). Of the original 15,000 copies published, less than 4,000 copies remain for free distribution to those belonging to USDA's Child Nutrition Programs (includes schools). Response from users has been virtually unanimously positive: "One of the best government products I've seen in a long time"; "I love this material. Please send me more"; "I think it's great! Exciting!! I've been needing something like this - thank you for doing such a great job".

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